

**The Effectiveness of Monetary Policy after the
Financial Crisis:
*Redefining the Role of the Central Bank***

Thesis

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Vera G. Dianova

from Novosibirsk, Russia

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Prof. Dr. Sergio Rossi (First Supervisor)

Prof. Dr. Andrea Terzi (Second Supervisor)

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To Francesco & Daniele

For the inspiration.

For the fortitude.

For the love and tenderness.

For the patience.

For all that words cannot describe.

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LIST OF ABBREVIATIONS & ACRONYMS

ABCP	Asset-backed commercial paper
ABRR	Asset-based reserve requirements
ABS	Asset-backed security
AD	Aggregate demand
AMLF	Asset-backed commercial paper MMMF liquidity facility
ARM	Adjustable rate mortgage
AS	Aggregate supply
BoE	Bank of England
CCB	Capital conservation buffer
CCyB	Countercyclical capital buffer
CD	Certificate of deposit
CPFF	Commercial paper funding facility
DAD-DAS	Dynamic aggregate demand, dynamic aggregate supply (model)
DSGE	Dynamic stochastic general equilibrium
EBITDA	Earnings before interest, tax, depreciation and amortization
ECB	European Central Bank
Fed	Federal Reserve
FIH	Financial instability hypothesis
FLS	Funding for lending scheme
FOMC	Federal Open Market Committee
FRBNY	Federal Reserve Bank of New York
GDP	Gross domestic product
IOER	Interest on excess reserves
IORR	Interest on required reserves
IS	Investment/savings curve
KS	Kashyap and Stein (model)
LM	Liquidity preference/money supply curve
LSAPs	Large-scale asset purchases
MBS	Mortgage-backed security
MMIFF	Money market investor funding facility

LIST OF ABBREVIATIONS & ACRONYMS

MMMF	Money market mutual fund
NAIRU	Non-accelerating inflation rate of unemployment
NCM	New consensus macroeconomics
NPV	Net present value
OMO	Open market operation
PDCF	Primary dealer credit facility
PR	Peek and Rosengren (model)
QTM	Quantity theory of money
R&D	Research and development
RA	Representative agent
RFR	Risk-free rate
RRP	Reverse repurchase agreement
TAF	Term auction facility
TALF	Term asset-backed securities loan facility
TSLF	Term securities lending facility

INTRODUCTION

On 19 January 2017, nearly one decade after the collapse of Lehman Brothers and the start of the most severe global financial crisis since the Great Depression, Chair of the Board of Governors of the Federal Reserve Janet Yellen delivered to the Stanford Institute for Economic Policy Research an optimistic address on the current state of the US economy and the cumulative success of monetary policy in the achievement of its two central objectives, namely, maximum employment and price stability (Yellen, 2017). Indicative of this success, according to Yellen (2017), are the measure of labour utilization, judging from the official U-6 unemployment statistics which indicate that labour utilization rates are only slightly below pre-crisis levels,¹ moderate economic growth which is supported by increasing household income and wealth, and a rising inflation rate, which is “now much closer to the [Federal Open Market Committee’s] two percent objective” as compared to the previous year.

Such a positive assessment of the *status quo* of US economic performance is, in the least, highly controversial, with other astute economic observers expressing concerns over a number of evidently problematic trends in the US economy that characterize the post-2008-crisis period. First, as Yellen herself admits in the above-mentioned address, overall growth of gross domestic product (GDP) remains lacklustre, with the damage inflicted by the crisis on the growth trajectory of the US economy evident even in simple back-of-the-envelope analyses (Roberts, 2014), a trend that continues to be exacerbated by rapidly growing income inequality in the United States (Price et al., 2016). Persistently weak productivity across the economy and the mismatch in the growth of unit labour costs and productivity are also of significant concern (Bartash, 2017). Although, according to official statistics, labour market conditions have improved dramatically in the post-crisis years, failure of these measures (including U-6, which utilizes the broadest-available categorization of unemployment) to capture a segment of the population which includes discouraged workers, underemployed workers and workers unemployed for over one year (no longer included in any statistical category of unemployment), results in a gross underestimation of total unemployment (Williams, 2017).

The corporate business sector, whose profitability has benefitted greatly from low interest rates that have persisted since the crisis (FactSet, 2017), also exhibits symptoms of a profound economic malaise in spite of record-high earnings: corporate investment remains

¹ See the Bureau of Economic Analysis, Table A-15, ‘Alternative measures of labor underutilization’, available at <https://www.bls.gov/news.release/empsit.t15.htm>.

well below pre-crisis levels, with corporations hoarding cash and redistributing a significant portion of earnings to their shareholders via buybacks and dividend pay-outs (Stein, 2012, p. 9). In the financial sector, by contrast, low interest rates have created significant tension, challenging the existing architecture of the pension system (Worstell, 2017) and creating a number of negative risk-taking dynamics in the banking sector. In spite of these problematic trends and the official optimism on the current state of the US economy, nearly a decade after the crisis began, when credit markets froze, the Federal Reserve (Fed) stepped into its crucial role as lender of last resort, and the policy rate of interest was brought to the zero lower bound, monetary policy remains highly accommodative, with the effective federal funds rate having risen to slightly above one percent only in mid-2017. Furthermore, although the Federal Reserve formally announced in the Federal Open Market Committee meeting of September 2014 its aim to ‘normalize’ policy by reducing its securities holding, the Fed’s balance sheet remains unchanged (at its peak of approximately \$4.5 trillion) at the time of writing.

While there is minimal disagreement with the view that the Fed played a fundamental role in the re-establishment of normal market conditions in the aftermath of the financial crisis of 2008, there is a significant amount of controversy on the degree of success that monetary policy has had in reinvigorating growth of the economy by way of ultra-low interest rate policy and an unprecedented mix of large-scale balance sheet policy. These policies have drastically altered the composition and size of the central bank’s balance sheet, and have steered the Federal Reserve into uncharted territory, both in terms of long-term consequences and ultimate reversal of policy. While constructive controversy is undoubtedly fundamental to academic debate, the financial crisis of 2008, which mainstream (neoclassical) economic theory was unable to either predict or explain, and the subsequent deep and drawn-out recession, which unprecedented doses of stimulative monetary policy were unable to prevent, highlights the urgency of re-evaluating the existing theoretical paradigm of monetary policy transmission. This paradigm, rooted predominantly in neoclassical economic theory, has shaped the Fed’s policy framework for the last several decades and has guided post-crisis policy in its pursuit of a rapid return to strong and sustainable rates of economic growth.

To this end, the subject of monetary policy effectiveness, not only in achieving its stated objectives of maximum employment and price stability in the United States, but also in stimulating economic growth (a goal which has become an implicit objective of post-crisis policy – see, for instance, Bernanke, 2012) is of paramount importance and invokes a number

of related conjectures, which we endeavour to scrutinize in this dissertation. But the most fundamental question, the answer to which may be the foundation for a response to numerous other concerns and uncertainties, is as essential as it is pertinent in the current debate of monetary policy transmission. It is a question that the experience of Japan's illustrious experiment with 'expansionary' monetary policy, and its failure to bring the country out of more than two decades of deflation and stagnant economic growth, make particularly poignant: how effective is monetary policy, when all available monetary artillery is employed, in stimulating economic growth and bringing the economy out of recession and on to the path of rapid and sustainable economic growth? Given the ongoing relevance of the debate on this topic in both the policy and the academic spheres, it is clear that decades of intensive research effort have failed to bring the discourse to a definitive conclusion. The issue is complicated further by the fast pace of change that has transformed and continues to transform the way modern economies function both domestically and internationally, as well as by the depth and complexity of the global financial system with which monetary policy interacts.

The choice of our exclusive focus on the United States in the ensuing analysis is motivated by the complexity of modern financial architecture and the diversity in the monetary systems within which the major central banks operate. The United States provides a relevant and salient case study given the importance of the US economy and its currency globally; indisputably, the success of the United States in defining and achieving valid monetary policy objectives is critical not only for the country itself, but also for the future of the global economy. Although the global importance of the US economy motivates our choice of case study, explicit consideration of the international implications of monetary policy implementation by the Federal Reserve is outside the scope of this dissertation, as is the evaluation of the theoretical legitimacy and practical success of the Fed's execution of its role as lender of last resort in the immediate post-crisis period, characterized by severe market tension and fundamental malfunctioning of the interbank credit markets. Instead, we take a longer-term perspective, capitalizing on the novelty of the US experience in the post-2008 crisis decade, which has provided a rich volume of empirical data on the behaviour of the economy in the aftermath of a severe financial crisis and during an episode of unprecedented (in scale and intensity) monetary policy intervention.

We adopt a historical-deductive method of analysis,² observing the behaviour of the US economy over the post-crisis decade and expounding the quandary that such observation suggests: unprecedented doses of monetary policy stimulus over a prolonged period of time have resulted neither in rising inflation rates nor in an ‘overheating’ economy, as neoclassical theory would predict. Has something changed in the fundamental structure of the US monetary system, rendering the existing inflation-targeting monetary policy framework – which for decades was credited with ushering in the era of (permanent) stability in both output and inflation (to wit, the Great Moderation) – inadequate in dealing with the challenges facing the modern economy? The wisdom of numerous heterodox economists, most notably Minsky (1982, 1986a, 1992) and Schmitt (1984), whose writing predicted in broad strokes the 2008 financial calamity and its aftermath decades before its occurrence, suggests otherwise.

The existence of such alternative (heterodox) theoretical frameworks for macroeconomic analysis, which have received indisputable affirmation in the recent years, indicates a paramount insufficiency in the existing orthodox paradigm, which neither predicts nor explains the occurrence of systemic crises. This is the essence of the modern crisis of macroeconomics (Rossi, 2011b, p. 307) and the foundation of our hypothesis of fundamental monetary policy ineffectiveness in countering stagnation, which we set out to evaluate in this dissertation. The approach adopted for this task is threefold: first, we critically analyse the theoretical validity of each (of a total of 21) hypothetical channels of monetary policy transmission; second, we consider the existing empirical evidence that either supports or negates the presumed mechanisms involved in the transmission of monetary policy stimulus to various sectors of the economy; third, we provide novel empirical evidence based on macroeconomic trend analysis, which on the whole supports the hypothesis of monetary policy ineffectiveness. To the best of our knowledge, no such comprehensive effort to consolidate, structure and critically analyse all hypothetical channels of monetary policy transmission has been made in either the mainstream or the heterodox economics literature to date.

The dissertation is structured as follows. Chapter 1 considers a most fundamental, age-old question, the answer to which lays the foundation for the analysis in the ensuing chapters: What is money? The theoretical substance of the debate on monetary policy effectiveness has shifted from a reliance on a quantity theory of money approach, a baseline

² This method is described in detail by Bresser-Pereira (2012).

assumption of standard classical monetary analysis, to the evaluation of the nature of money endogeneity, central to which is the financing and money creation role of banks, a concept belonging, in its integral elaboration, to the heterodox (post-Keynesian) school of thought. In order to arrive at a wholesale appreciation of the irrefutable nature of money's endogeneity, we trace the historical evolution of monetary thought, beginning with an emphasis on the indispensable contributions of late nineteenth- and early twentieth-century economists, such as Hume, Mitchell, Schumpeter and Wicksell, whose embryonic ideas on money endogeneity provided crucial groundwork for an elaboration of the concept by later-day economists.

The eventual rejection of the classical distinction between real and monetary analysis and the adoption of the credit (rather than the commodity or fiat) view of money, are also critical steps in the early evolution of monetary thinking and the divergence of monetary theory from classical tradition, a trend given notoriety and permanence by the writing of Keynes in the 1930s. Amongst Keynes's numerous noteworthy contributions, the elaboration of the concept of effective demand, or the equilibrium aggregate demand at one point in time, and the theory of liquidity preference, which considers the relationship between a change in the interest rate and a change in aggregate investment, would prove essential to monetary analysis, and particularly instrumental in the elaboration of a comprehensive heterodox analytical framework. Not only did Keynes embrace the money creation and financing role of banks' perspective, he also elaborated to an important degree the investment-creates-savings view, a vital cornerstone of heterodox economic thinking to this day. Unfortunately, the Keynesian revolution soon lost its centrality in policy making, and orthodox perspectives, at times disguised as Keynesian elaborations, took over, with Hick's (1937) proposal of the IS-LM model and Phillips's (1962) conjecture of a stable statistical relationship between wage increases and the rate of unemployment, known to this day as the Phillips curve.

The chapter's subsequent discussion takes the reader through the evolution in the dominant paradigm of monetary theory from Friedman's monetarism, characterized by a return to exogenous money, long-term monetary neutrality and reliance on the natural interest rate hypothesis, to the rational expectations revolution, which ushered in concepts pivotal to this day, such as the rational, utility-maximizing representative agent, and finally to the reconciliation of monetarist and (frequently misinterpreted) Keynesian ideas in the New Keynesian compromise and to the elaboration of the New consensus macroeconomics (NCM) paradigm. The NCM framework remains the central monetary policy-making framework to this day. As will be shown in this dissertation, developments in the second half of the twentieth century largely stripped mainstream monetary theory of a fundamental appreciation

of the role of money and credit in the economy, producing a theoretical framework devoid of meaning or predictive power for an economy in the midst and in the aftermath of a financial crisis.

In stark juxtaposition to these mainstream developments stands the theoretical evolution of the heterodox post-Keynesian framework of monetary analysis, which began to take shape in the 1950s and which emerged as a comprehensive and elaborate alternative to neoclassical theory. Critically, the post-Keynesian approach focuses on economic growth dynamics within a monetary production economy, central to which are the profitability-motivated creation of endogenous credit money by the banking sector, a demand-determined level of output, corporate investment as a fundamental determinant of long-term economic growth, the possibility of multiple long-term employment equilibria and a comprehensive theory of leverage cycles and financial crises which threaten the long-term health and the rate of endogenous growth of the economy. In this context, post-Keynesians challenge on numerous counts the current inflation-targeting monetary policy framework, a subject that is elaborated on in the subsequent chapters.

To this end, Chapter 2 focuses on the theory of central banking, providing an analysis founded on the endogenous money view, which emphasizes the inability of the central bank to control monetary aggregates as well as the theoretical inadequacy and empirically-proven irrelevance of the money multiplier, and which highlights the importance of demand-driven bank lending as the determining factor in the expansion and contraction of the supply of credit money. The chapter begins by offering an overview of the historical evolution of the theoretical paradigm of US central banking, which gives important insight into the ultimate elaboration of the governing paradigm that is subsequently criticized from a post-Keynesian perspective. It is also critical at this juncture to evaluate (and reconsider) the Fed's stated policy mandate, which we reformulate to give central emphasis to the current rate of economic growth, and to consider the vital role of the central bank in preventing financial crises, given the importance of the post-Keynesian assumption of an endogenous, path-determined rate of economic growth, which is fundamental in our analytical framework. Subsequent analysis indicates that there is convincing evidence that near-zero interest rate policy and large-scale balance sheet policy employed by the central bank, aimed at speeding up economic recovery, have the contrary effect. They inflict lasting damage on the financial architecture and create a number of negative destabilizing dynamics that contribute to the accumulation of imbalances, which are likely to ultimately lead to the occurrence of a sequential financial crisis.

In order to prepare the ground for a detailed analysis of the transmission channels of monetary policy in the subsequent chapters, Chapter 2 offers a detailed exposition of the mechanisms of monetary policy active in daily liquidity (reserve) management and in the implementation of policy in pursuit of longer-term objectives, including interest rate and balance sheet policy, as well as forward guidance. Our detailed consideration of the NCM model used by the Fed to formulate a specific strategy for the use of existing policies in the achievement of specified targets (and, ultimately, objectives) leads us to emphasize the inadequacy of a framework that relies on significant oversimplification, unrealistic assumptions and a number of erroneous theories. We criticize the model's assumption of exogenous money, a central bank-determined rate of inflation, the existence of a natural rate of interest, a representative agent and an exogenous, long-run potential rate of economic growth, to name just a few of the more problematic postulates of mainstream monetary theory.

Finally, we sketch a blueprint of an alternative theoretical framework for the evaluation of monetary policy, which will form the backbone of subsequent analysis, based on a number of crucial post-Keynesian ideas. The final section of Chapter 2 underscores the importance of complex dynamics and fundamental uncertainty, which are inherent to economic systems, and the resulting insufficiency of reductionist linear equilibrium analysis, which presumes that economic events follow a 'stable' stochastic (ergodic) process, which has been so eagerly adopted and applied in recent decades by mainstream neoclassical economists. We argue that at the heart of the post-Keynesian rejection of ergodicity in economic analysis are the concepts of radical (ontological) uncertainty, animal spirits and the complex network of interlinkages that determine the nature of interaction of economic agents and define the subjective, frequently irrational and unpredictable process of economic decision making, all of which in turn influence economic outcomes. Such a characterization of the economic reality holds important implications for the formulation of an appropriate and effective approach to central bank policy implementation, a task that we relegate to the final chapter of the dissertation, proceeding in the subsequent two chapters to the analysis of the individual transmission mechanisms of monetary policy in the context of the heterodox theoretical framework formulated in Chapter 2.

Having formulated a solid theoretical foundation for the analysis of central bank policy, we move on to examine the transmission mechanisms of interest rate and balance sheet channels in Chapter 3. While much progress has been made in both theoretical and empirical research on this subject over the recent decades, the question of whether monetary

policy, with its expanded and adapted policy kit, is able to make a significant impact on the pace of recovery in economic activity remains largely unanswered. To this end, the goal of Chapter 3 is to enhance our understanding of whether monetary policy, via definitive and definable transmission channels, is able to stimulate consumption and investment and thus the endogenously-determined rate of economic growth in a post-financial-crisis era.

The third chapter makes a number of important contributions to the existing literature. First, a clear and systematic analysis of the theoretical transmission channels of monetary policy is in itself an important undertaking, as there appears to be significant confusion in the existing literature in terms of the mechanisms of the various channels, the related terminology and the theoretical framework on which each is based. Second, the use of the post-Keynesian theoretical framework set out in Chapter 2 makes the following analysis a crucial contribution to the body of heterodox economics literature on this subject, which remains particularly unsubstantial. We further amplify the scope of the discussion by considering the effectiveness of the Fed's policy implementation in delivering the desired stimulus via the active transmission channels to the production economy and the side effects (costs) that the use of this strategy entails. Finally, we offer a review of the empirical evidence on each of the transmission channels found to be theoretically robust and practically actionable. The findings of the comprehensive research effort presented in Chapter 3 suggest that monetary policy is ineffective in its goal of stimulating consumption and investment, with policy transmitted via a number of active transmission channels that deliver imprecise, unpredictable and at times diverging stimuli to the economy during the period of post-crisis recession, and that the Federal Reserve's policies affect predominantly the financial markets, with little systematic transmission to the production economy. The mixed, and frequently contradictory, results of empirical research published in recent years speak in support of the conclusions of this analysis.

Chapter 4 offers an extension of the analysis begun in the previous chapter, by examining the monetary policy transmission channels that fall under the category of bank lending and risk-taking channels, and by considering the importance of income effects on endogenous growth. A consideration of dynamics in the banking sector is fundamental to our analysis in that much of the Federal Reserve's post-crisis policy focused on the financial sector with one of the central objectives being to stimulating bank lending, a strategy based on the view that tight credit was deterring spending and investment, thus contributing to the weakness in economic growth since the crisis (Bernanke, 2012).

Heterodox economics theory, particularly post-Keynesian, preceded the mainstream in its inclusion of and emphasis on the importance of the banking sector to economic outcomes and the transmission of monetary policy. Furthermore, as our discussion will illustrate, post-Keynesian theory remains at odds with much of the mainstream perspective on the role of banks and on the mechanisms that determine the effects of changes in the monetary policy stance on both the financial sector and production activities. Crucially, a post-Keynesian theoretical perspective underscores that the decision of the banking sector to lend does not depend on the availability of reserves provided by the central bank, which in actual fact the central bank provides continuously on demand. Additionally, it brings to light the circular nature of the interaction between credit provision and the expansion of output, whereby expanding credit permits greater investment and output, while the process of economic growth necessitates the (demand-driven) granting of credit to finance entrepreneurial activity. Furthermore, policies designed to increase the quantity of aggregate savings, with the purpose of stimulating lending and consequently economic activity, are futile, as the granting of loans does not depend on the quantity of deposits (which are associated in an erroneous relationship with pre-existing savings in the neoclassical perspective) on a bank's balance sheet. Rather, a loan is granted and a deposit is created simultaneously in an accounting transaction that results from a profit-centred decision by a bank to increase marginal lending.

The results of the analysis, much as in the case of Chapter 3, lead us to conclude that monetary policy which aims to stimulate aggregate demand and economic growth via the banking sector is largely ineffective, may generate a number of potentially problematic dynamics within the financial sector which we refer to as the risk-taking channel of monetary policy transmission, and may depress aggregate demand via the negative income channel. Our analysis argues against the expansion of the Fed's existing policy kit to include to-date untried initiatives such as lending for credit and negative interest rates, policies adopted by other major central banks around the globe, and cautions against reliance on the expectations channel of monetary policy transmission, which has been largely depleted by the failure of monetary policy to fulfil prior expectations over the course of the post-crisis decade. On the basis of these conclusions, we argue that it is now possible to offer an informed, substantiated view in favour of the perspective that views as fundamental a prevention of the accumulation of financial imbalances. This perspective is coherent in the context of the severity and length of the Great Recession and the findings of our research effort that bring us to the conclusion that beyond its role of lender of last resort, the central bank does not have the potential to

stimulate economic growth in the post-financial-crisis period characterized by weak demand, low productivity growth, voluntary deleveraging, liquidity hoarding, and general pessimism on the economic prospects of the foreseeable future.

At this stage, our comprehensive theoretical and empirical analysis of all hypothetical transmission channels of monetary policy is complete. Armed with unique, valuable conclusions, we move on to Chapter 5, the ambitious goal of which is to build a theoretical framework for understanding post-crisis stagnation and domestic economic growth determinants, which hold the potential to counter the forces of this phenomenon. We rely on the theoretical and empirical findings of Chapters 1-4 to delineate the dynamics of monetary policy transmission within the context of both stagnation and growth regimes, with the ultimate purpose of drafting definitive recommendations for the implementation of interest rate and balance sheet policy, and macroprudential regulation in future. We begin by presenting a number of competing mainstream theories that have been used to explain the prolonged stagnation of the US economy, revealing their theoretical flaws and consequent inability to explain the failure of monetary policy to efficiently and effectively draw the economy out of recession. We then develop an alternative framework, capitalizing on the theoretically-expounded and empirically-affirmed household and corporate sector dynamics from our work in Chapter 3, and a number of innovative and highly relevant strands of growth theory, which in symbiosis reveal the possible vicious/virtuous cycles of economic activity in the production economy, suggesting the importance of a well-formulated policy approach in determining the future of the US economy.

Our analysis underscores the danger of a prolonged period of low interest rates, the failure of monetary authorities to recognize and incorporate into policy models the existence of the leverage cycle, and the implementation of policy that aims to sustain economic growth by encouraging increasing leverage amongst households and corporations, temporary asset price inflation and increasingly aggressive lending practices by the banking sector. Instead, we argue that it is imperative for the central bank to adopt a revised delineation of monetary policy transmission, accurate in its representation of what monetary policy can and, most important, cannot do, thus embracing the limits of its powers in order to re-establish and reaffirm its validity and centrality in economic policy making. A key to the achievement of this goal, in our view, is the replacement of inflation targeting with the objective of promoting maximum sustainable rates of GDP growth, the establishment of a longer-term horizon for the delineation of a monetary policy stance abandoning thus the futile attempts to

micromanage the economy, and the demonstration of a consistent commitment to ensuring financial stability.

In its essence, our argument is centred on three main recommendations. First, we suggest that a successful monetary policy must focus on the effective achievement of a stable, moderate level of the policy rate of interest, which may be set by aligning the change in the real rate of interest to the growth rate of labour productivity. Second, we believe that large-scale balance sheet policies, which have become an implicitly-permanent element of the Fed's policy kit, should be decommissioned, since in a monetary policy paradigm within which a central objective is the maintenance of stable, moderate interest rates in the medium to long term, policies designed to lower long-term interest rates and depress the cost of funding for households and firms are clearly counterproductive and potentially detrimental. Furthermore, balance sheet policies stoke asset price bubbles, augment corporate and household leverage and create a number of negative dynamics in the financial markets that lead to weaker balance sheets, squeeze risk margins, encourage the expansion of the financial, at the expense of the production, sector and in so doing create dangerous leverage cycles that inevitably end in devastating systemic financial crises.

The monetary policy framework that this dissertation advocates envisages, therefore, a central bank that, in the absence of critical financial tensions, is limited in its activities to the conduct of daily defensive and accommodative liquidity management operations, with the intermediate goal of maintaining moderate, stable rates of interest in the medium to long term, and with the ultimate objective of promoting maximum sustainable rates of economic growth. As we also argue for the fundamental necessity of preventing financial crises, which inflict profound, long-term damage on the endogenous, path-determined dynamics of economic growth, our third recommendation emphasizes the importance of the elaboration of a macroprudential regulatory framework that would be effective in addressing this challenge. First, we consider two policies, namely, the countercyclical capital buffers initiative and the asset-based reserve requirements proposal, highlighting the benefits and shortcomings of their implementation and theoretical effectiveness. Finally, we evaluate an alternative, more comprehensive, reform proposal, which suggests the possibility of eliminating leverage cycles and averting the related, endogenously-generated systemic financial crises, and which involves addressing the structural flaw in the domestic payments system, so as to prevent banks from creating money in excess of income produced in the economy as a whole (Cencini & Rossi, 2015). We conclude that only by eliminating this flaw can regulatory reform hope to effectively address the related problems of financial speculation, leverage

INTRODUCTION

cycles, asset price bubbles and the inevitable (in the current system) occurrence of periodic, devastating financial crises, which inflict lasting damage on endogenous, path-determined growth dynamics, and which render monetary policy entirely ineffective in achieving the objective of promoting maximum sustainable rates of employment and long-term economic growth.

1. THE THEORY OF MONEY: A HISTORICAL EVOLUTION

“The investment market can become congested through a shortage of cash. It can never become congested through a shortage of saving. This is the most fundamental of my conclusions within this field” (Keynes, 1937, p. 669).

What is money? This question, seemingly banal, has over the centuries caused incessant debate and profound disagreement in intellectual circles, with fundamental divergence in answers put forth and fervently defended by proponents of varying schools of economic conviction. By tracing the historical evolution of the view on money within the most influential schools of thought over the course of the twentieth century, the following discussion will provide the groundwork for analysis in the ensuing chapters, and the presentation of the debate over the endogeneity versus exogeneity of money will substantiate the theoretical foundations that form the basis of the framework used in this dissertation. The framework employed draws predominantly on ideas originating in post-Keynesian literature, that is, a theoretical paradigm founded on the principles of money endogeneity, central to which is the financing and money creation role of banks, a profitability and demand-driven view of bank lending and a definition of economic growth as endogenous and path-dependent, all crucial concepts deemed most theoretically convincing and instrumental in the proposed analysis. However, it will also become evident that the assumption of money endogeneity does not necessarily lead us to the conclusion that monetary policy is effective in its efforts to stimulate long-term economic growth, as, in its essence, money endogeneity underscores the limits of monetary policy rather than illuminating its potency.

To this purpose, the chapter’s discussion proceeds as follows: we first define, discuss and challenge the quantity theory of money and the related view of monetary neutrality and superneutrality, concepts that have been central to monetary analysis in mainstream theory for centuries. The subsequent section elaborates on this subject, focusing on crucial developments in the area of monetary thinking with the emergence of embryonic ideas on money endogeneity in a credit economy introduced by Wicksell. The ideas of Keynes, published in *The General Theory* (1936), are discussed thereafter, with a particular focus on his important contribution to the profession’s understanding of the role and the nature of credit money in the production economy. We continue our discussion by considering the contributions of Keynes’s followers, such as Phillips (1962), and the challenge mounted by

Friedman (1956) and his followers to the generally-accepted Keynesian framework of the time.

Our consideration of the historical evolution of monetary thinking would be incomplete, however, without a discussion of the role of leverage and the non-neutrality of money in the heterodox framework developed by Minsky in the 1970s, and the 1980s search for compromise between the Keynesian and monetarist schools of thought, which resulted in an unfortunate marginalization of the concept of money and its role in the economy. Subsequently, we discuss the New consensus macroeconomics framework that emerged thereafter, and which remains the central monetary policy-making paradigm to this day, a framework that has largely maintained an analytical framework based on the classical quantity theory of money analytical approach. The final sections of Chapter 1 introduce a number of concepts fundamental to the elaboration of an alternative framework for the analysis of money's role in a monetary production economy, as well as the effectiveness of monetary policy. We discuss money endogeneity and the role of bank credit, as elaborated within the post-Keynesian framework, the determinants of bank lending within this endogenous money perspective and the informative post-Keynesian description of the flow of bank money within the monetary production economy, thus drawing a critical distinction between 'money' issued by the banking sector and 'income' that is created as a result of productive effort of workers. We conclude the discussion with a critical analysis on the meaning and causes of inflation within the mainstream and the post-Keynesian analytical frameworks, highlighting the significant divergence in implications of the contrasting perspectives for monetary policy making.

1.1 THE QTM, MONETARY NON-NEUTRALITY AND THE ENDOGENOUS NATURE OF MONEY

The theoretical substance of the debate on monetary policy effectiveness has traditionally focused on a discussion of money's long-term neutrality and superneutrality, at the heart of which lies the quantity theory of money (QTM), traced back to the 1752 work of David Hume (Patinkin & Steiger, 1989, p. 131), and brought to the centre of the economic debate by David Ricardo in the early nineteenth century. The now-popularized term 'neutrality of money' did not come into use until Friedrich von Hayek's 1931 lecture at the London School of Economics (*ibid.*, p. 132), but the concept of money neutrality represents one of the fundamental principles of early classical monetary theory.

The QTM stipulates a simple relationship between the quantity of money in circulation, presumed to be the result of central bank decision making, and the price level. The equation of exchange is frequently used to illustrate this relationship: $M*V = P*Q$, whereby the monetary base (M) multiplied by the velocity of money circulation (V) equates to national output (Q) times the price level (P). This equation is frequently and inaccurately used as the definition of the QTM, while in actual fact it is a simple equality that holds by definition (McCallum & Nelson, 2010, p. 4); rather, it is the interpretation of this equality within the quantity theory framework that holds significant implications for monetary theory and policy of the classical economic tradition.

The argument put forth by the QTM is that, as the central bank manages monetary aggregates – something it is in practice unable to do – it ultimately affects only the nominal price level, holding velocity and output constant. While some modern supporters of the quantity theory would digress (*ibid.*, p. 5), the QTM approach to monetary analysis implies money exogeneity, whether the central bank is presumed to rely on the management of monetary aggregates or, more accurately, the interest rate, to achieve its policy target. In either case, it is presumed that the central bank either directly or indirectly (by changing the policy rate of interest) affects the availability of money in the system. In fact, a thorough appreciation of the endogeneity of money, as will be developed in this chapter, leads us to the opposite conclusion, as the interest rate is but one factor affecting the *endogenous* creation of money by the banking sector.

The QTM has been used by classical economists to substantiate the idea of money neutrality and superneutrality. The former states that a one-off, unexpected, significant and, in theory, permanent change in the quantity of money in circulation within an economic system causes the price level to increase proportionately but leaves all real variables, such as real output, consumption expenditure and real interest rates, unchanged. Similarly, the idea of money superneutrality refers to the event of an unexpected and permanent change in the growth rate of the monetary base, which would result in a change in the inflation rate but no change in real economic variables. For supporters of these ideas, monetary policy is thus powerless to influence real economic activity as a result of money (super)neutrality and must limit itself to preserving price stability by ensuring an appropriate quantity of money in circulation.

While it is frequently claimed by economists of the modern classical school that money neutrality, as illustrated by numerous quantitative studies, is undisputable (Bullard, 1999), monetary policy in the period following the Great Recession paradoxically relied on

the expansion of the monetary base as the central operational target of policy aimed at stimulating economic growth. Admittedly, even among the early classical economists there existed a divergence of views on the neutrality of money and the role of monetary policy: while some economists (for instance, David Ricardo and John Wheatly) argued for absolute money neutrality even in the short run, others, such as David Hume and Henry Thorton, identified a number of sources of money non-neutrality, such as the lag of prices behind money supply, sticky fixed costs, and the lag of wages behind prices, to name just a few (Humphrey, 1991). All such exceptions concerned the short run, however, with long-run money neutrality remaining largely undisputed.

A supporter of short-run money non-neutrality, David Hume (1987, II.III.8) noted with regards to the long term that “it is of no manner of consequence whether money be in a greater or less quantity” at any point in time (to wit, long-term money neutrality holds). However, Hume believed that a persistent rise in the quantity of money could bring economic benefits (hence, money superneutrality does not hold). He notably wrote that “[t]he good policy of the magistrate consists only in keeping [money], if possible, still increasing; because, by that means, he keeps alive a spirit of industry in the nation, and increases the stock of labor, in which consists all real power and riches” (*ibid.*, II.III.9). One fundamental concern with the ideas of Hume, however, as noted by Lucas (1996) in his Nobel Prize lecture on money neutrality, is that money appears to enter and leave the economy ‘magically’, getting slipped into the pockets of individuals or being ‘annihilated’, while the mechanism by which this occurs remains undefined. This is, indeed, a crucial criticism, as the issue of money endogeneity versus exogeneity, that is, the question of the mechanism by which the quantity of money within an economic system fluctuates, is fundamental to the discussion of monetary policy effectiveness.

A few early classical economists, Mitchell being a notable example, were in complete disagreement with the QTM. Mitchell (1896) argued that the relationship between the quantity of money in circulation, national output, and prices is far more complex than suggested by the simplistic equation of exchange. Mitchell believed that much of the quantitative analysis used to support the QTM had fallen prey to the fallacy of reverse causation, with the quantity of money increasing in response to an increased demand for money (accompanied by inflation in the economy), rather than the reverse, as such analyses aimed to illustrate.

1.2 THE ROLE OF MONEY IN THE MONETARY PRODUCTION ECONOMY

In Mitchell (1896), Schumpeter (see Keen, 2014, p. 272; Werner, 2014b, p. 3) and Wicksell (1965), to name just a few, one glimpses the embryonic ideas on money endogeneity, a concept that did not begin to enter mainstream economic thinking for nearly one century from the time of these economists' earliest elaboration of the subject.³ In fact, the classical economic tradition, which dominated the mainstream until the Keynesian Revolution of the 1930s, did not allow for a significant role of money, which would have made money endogeneity a central consideration. The barter economy, or real exchange economy, so termed to by John Maynard Keynes, was believed to be an accurate representation of any economic system, including the capitalist economy. An exchange of goods is at the heart of such a system, and money has no role beyond facilitating this exchange. By contrast, in a monetary production economy, money is central to the functioning of the system.

The role of money in a monetary production economy gathered increasing attention in the early twentieth century. Writing in the first decade of that century, Wicksell (1965), although a quantity theorist himself, brought to light his view of the 'institutional nature of money', that is, the credit system, in contrast to the prevailing view of money as fiat or as a commodity (as seen in the traditional quantity theory approach). This shifted the central economic paradigm one step closer to the appreciation of the endogenous nature of money, although in his work Wicksell continued to maintain a distinction between 'real' and 'monetary' analysis. Wicksell's work made a number of lasting contributions to modern monetary theory, with the following being particularly noteworthy. First, Wicksell distanced himself from the idea, central to classical monetary thought, that the central bank controls monetary aggregates, and instead modelled a banking system where the key variable was the interest rate. Second, Wicksell introduced the idea of a natural rate of interest and explained inflation as the result of a misbalance between the level of investment and the amount of available savings, or, alternatively, a mismatch between the natural rate of interest and the market loan interest rate (Fontana, 2007, p. 47). Wicksell's work was responsible for shifting the focus of the debate on monetary theory away from the preoccupation with long-run neutrality of money and towards a more policy-oriented concern with monetary equilibrium, or short-run money neutrality (Nobay & Johnson, 1977, p. 472). He further highlighted the importance of the availability of credit and the level of the market rate of interest to firms'

³ Werner traces the early ideas on money endogeneity to Schumpeter's 1912 publication (in German), while Wicksell's first ideas on the concept appeared in his work published in 1898 (also in German) (Werner, 2014b, p. 3).

investment activity and thus economic growth. Inflation, rather than reflecting an oversupply of money issued by the central bank, could result from excess demand (resulting from loose credit conditions) or excess supply of the inputs to production and ultimately of consumption goods, according to Wicksell (1965, p. 90). While stressing the importance of the availability of affordable credit, Wicksell further correctly highlighted the limited ability of the expansion of credit to increase produced output (while the unavailability of such credit would most certainly constrain production). In developing this argument, he distinguished between the ‘tendency’ for production and the ‘fact’ of production:

Easier credit sets up a *tendency* for production (and trade in general) to expand; but this does not in any way imply that production will *in fact* increase. There will in general be no such increase, or only a relatively small one, if the available means of production, labour and so on, are already almost fully occupied (*ibid.*, p. 90).

As will become evident in further discussions, Wicksell’s ideas on credit hold significant implications for the effectiveness of monetary policy. In brief, policy measures that rely on the easing of monetary conditions with the aim of increasing bank credit and ultimately stimulating economic growth are bound to fail. Understanding the precise mechanisms that cause this policy to fall short of aspirations, however, requires the elaboration of a comprehensive framework for the analysis of monetary policy, which is the main task and most essential contribution of our work, presented in the subsequent sections and chapters.

1.3 THE KEYNESIAN REVOLUTION AND THE LOANS-CREATE-SAVINGS VIEW OF BANK MONEY

In spite of Wicksell’s significant contribution to the profession’s understanding of the role of credit in a monetary economy, acceptance of the view that money is created endogenously within the banking sector by the issuance of credit would be long in coming. However, a growing number of scholars began to question the central tenets of the quantity theory of money. In response to this mounting debate in the first decade of the twentieth century, Irving Fisher, in his book *The Purchasing Power of Money* (1922), aimed to address the challenge posed by the opponents of the quantity theory to the view that the amount of money in circulation, M , is the cause of the change in the price level, P (Persons, 1911, p. 819). One of the central elements of Fisher’s argument was that an increase in M necessarily translates into easier loans and hence stimulates trade, which in turn increases the price level through a number of direct and indirect channels (*ibid.*, pp. 820-821). This mechanism, generally

referred to in modern literature as the money multiplier, has been a frequent subject of debate on monetary policy effectiveness since the publication of Fisher's work. Although for a number of fundamental reasons (see sections 1.9 and 4.1.1) this mechanism does not operate in the modern economy (for empirical proof of the inexistence of the presumed relationships see Carpenter & Demiralp, 2012), arguments formulated along the lines of Fisher's model are still presented as the justification for the effectiveness of monetary policy that relies on the expansion of the monetary base with the aim of stimulating economic activity (see, for instance, Freeman & Kydland, 1998).

Concern with money neutrality dominated academic discussions in the field of monetary economics until the 1930s and the publication of Keynes's *General Theory* in 1936 (Keynes, 1947). The Great Depression, which hit the US economy during that decade, drastically altered the economic landscape of the country and created an intellectual vacuum which classical economic theory was unable, at the time, to fill. In retrospect, there is general agreement that the inaction of the US Federal Reserve was partly to blame for the length and the depth of the depression, and at the time numerous scholars turned in search of an alternative economic paradigm, a search that culminated in the Keynesian Revolution. Keynes, who at the time of writing of *A Treatise on Money* (1930) was himself a quantity theorist (Nobay & Johnson, 1977, p. 473), later changed the focus of his work, moving the academic debate away from the quantity theory and abandoning definitively the classical dichotomy between real and monetary analysis. As he argued:

Money in its significant attributes is, above all, a subtle device for linking the present to the future; and we cannot even begin to discuss the effect of changing expectations on current activities except in monetary terms [...]. So long as there exists any durable asset, it is capable of possessing monetary attributes and, therefore, of giving rise to the characteristic problems of a monetary economy (Keynes, 1947, p. 294).

Keynes's critique of the quantity theory of money was comprehensive. First, he argued that as long as there is unemployment, any increase in the quantity of money would lead to an increase in employment, assuming homogeneity of unemployed resources, only marginally affecting the price level. He further correctly concluded that the relationship between the quantity of money and the price level is further complicated by changes in aggregate demand, heterogeneity of unemployed resources, and changes to marginal costs of inputs to production, including increases in wages, as well as the interaction of the latter factors among themselves (*ibid.*, pp. 295-297).

Keynes's analysis of what he referred to as *effective demand*, essentially equilibrium aggregate demand at one point in time, is another of his noteworthy contributions to monetary theory. Following the Wicksellian tradition, Keynes analysed the effect of a change in the interest rate on effective demand, taking into consideration a schedule of liquidity preference,⁴ a schedule of marginal efficiencies (which represent a relationship between a change in interest rate and a change in aggregate investment), and an investment multiplier (representing a relationship between changes in investment and changes in effective demand). In conducting this analysis, Keynes stressed the complicated nature of this relationship, with a further interaction among these factors and the factors mentioned previously as determinants of changes in the price level (*ibid.*, p. 298).⁵

As evidenced by the above discussion, Keynes's insightful analysis of the quantity theory of money introduced a number of critical complications into what was previously upheld as a relationship informative in its simplicity, which dictated an undisputable approach to monetary policy dedicated to maintaining price stability via control of monetary aggregates. Furthermore, Keynes's analysis of the relationship between savings and investment offered an unorthodox viewpoint, which was at the time and has been since neglected by mainstream classical economists. His ideas have, however, been central to the analysis of the modern US economy for heterodox economists and have proven instrumental in explaining the causes of the financial crisis of 2008, as well as the failure of the Federal Reserve's monetary policy to stimulate economic growth in its aftermath.

Keynes's earlier writing made an important contribution to the ongoing debate on the nature of money (Wray, 2014, pp. 14-18), initiated by Knapp's exposition of the 'state theory of money' in the early twentieth century (Knapp, 1924). Knapp's view, which was a critical divergence from the mainstream definition of money as a medium of exchange whose value was originally associated with its link to precious metals, forms the basis of the chartalist school of thought, a perspective to which many heterodox economists ascribe to this day (Goodhart, 2015, p. 90). Keynes supported Knapp's view of money as the creation of the State and its derivation of value from the very fact that it is backed by sovereign authority, which imposes on all its citizens the obligation to pay taxes in the currency it emits. The work

⁴ This concept was in itself one of the major contributions of Keynes's work. Keynes (1947, p. 166) defined liquidity-preference as "a schedule of the amounts of [an individual's] resources, valued in terms of money or of wage-units, which he will wish to retain in the form of money in different sets of circumstances".

⁵ See also the contribution of Kalecki to the development of the concept of effective demand (Kalecki, 1935, pp. 332-333). While Keynes's fame anticipated that of Kalecki by some years, a number of early papers written by Kalecki in Poland in the early 1930s, before the publication of *The General Theory*, can be considered precursors to Keynes's ideas on effective demand (Sawyer, 1998, p. 3; Assous & Lopez, 2010, p. vi).

of early thinkers such as Knapp and Keynes, but also Mitchell Innes and Schumpeter, whose contribution to this subject is discussed in detail by Wray (2014), led to the evolution of a coherent alternative to the mainstream view on money, and was capitalized on by later-day economists such as Lerner (1943), Minsky (1986b, p. 231), Goodhart (1998), Wray (1998), Mosler (2010) and Terzi (2014). The policy implications of economic analysis on the basis of the ‘state theory of money’ are of fundamental importance, particularly relating to the subject of fiscal policy, as analysed in detail by Goodhart (1998, pp. 419-425), Terzi (2014, pp. 21-23) and Wray (2014, pp. 28-31).

Keynes’s contribution to the theory of money extended further. In *The General Theory*, Keynes argued for what is referred to in more recent economic discussions as the money creation and financing role of banks. Rather than viewing the quantity of money as the result of purposeful decision making at the central bank, Keynes clearly viewed it as the result of the issuance of credit by the banking sector, which leads to a corresponding amount of savings being created. He thus also believed that it is investment which creates savings, rather than savings creating investment as presumed in mainstream theory. When banks issue new credit for the purpose of funding investment, “the savings which result from this decision are just as genuine as any other savings. No one can be compelled to own the additional money corresponding to the new bank-credit, unless he deliberately prefers to hold more money rather than some other form of wealth” (Keynes, 1947, p. 83). He further accurately observed that credit expansion is as much the cause as the result of increasing economic output, characterized by promising investment opportunities:

It is also true that the grant of the bank-credit will set up three tendencies (1) for output to increase, (2) for the marginal product to rise in value in terms of the wage-unit [...], and (3) for the wage-unit to rise in terms of money (since this is a frequent concomitant of better employment); [...] but these tendencies are characteristic of a state of increasing output as such, and will occur just as much if the increase in output has been initiated otherwise than by an increase in bank-credit (*ibid.*, p. 83).

Keynes was not alone at the time of writing in his association of money with loans, nor, as mentioned previously, was he the first to suggest the endogenous nature of money creation. Similar ideas were, perhaps most notably, published by Joseph A. Schumpeter in 1934 (two years before the publication of *The General Theory*), and were to be used by Hyman P. Minsky in the development of his ‘financial instability hypothesis’ several decades later. Schumpeter categorically rejected the classical view of money as a medium of exchange, writing: “Of course if one were to say that money is only a medium of facilitating the

circulation of goods and that no important phenomena can be connected with it, this would be false” (Schumpeter, 2007, p. 96). Crucially, he argued that credit is money, stating that the question of whether or not it should be defined so “has been answered affirmatively by many of the best writers” (p. 97), and pointed out that “[t]he creation of money by the banks establishing claims against themselves [...] has become a commonplace to-day” (p. 98). Even more important and insightful is Schumpeter’s conclusion that it is credit which creates bank deposits, rather than the reverse (p. 99), and that “[t]he credit structure projects not only beyond the existing gold basis, but also beyond the existing commodity basis” (p. 101), an idea that would form the basis of Minsky’s analysis of the cycle of debt accumulation and deflation.

Keynes came to similar conclusions in his analysis of the role of bank deposits, framing the discussion in the context of the relationship between savings and investment. Specifically, Keynes (1947, p. 81) rejected the idea that marginal savings result in an equal amount of investment, an element of classical models of savings and investment which implies that a lack of savings could lead to a slowdown in investment and hence economic growth, possibly leading to a financial crisis. Rather, he argued that entrepreneurs will choose the level of investment based on their estimate of the level of effective demand; any increase in investment over the level of existing savings will result in an increase in output and employment in the subsequent period: “[T]he expectation of an increased excess of Investment over Saving, given the former volume of employment and output, will induce entrepreneurs to increase the volume of employment and output” (p. 78). The view, generally agreed upon at the time of his writing, that savings and investment could differ “is to be explained, I think, by an optical illusion due to regarding an individual depositor’s relation to his bank as being a one-sided transaction, instead of seeing it as the two-sided transaction which it actually is” (p. 81).

Keynes thus rejected the idea that there can be savings without investment or investment without savings, upholding what he called “the old-fashioned view that saving always involves investment” (p.83), but he emphasized the error in the cause-effect relationship of the two elements: “The error lies in proceeding to the plausible inference that, when an individual saves, he will increase aggregate investment by an equal amount” (p. 84). Rather, as discussed above, it is the decision to invest, given the possibility to secure the necessary credit, which creates the corresponding amount of savings. Keynes eloquently tied together his analysis of the quantity theory of money with this view on savings and investment, stating:

Thus incomes and such prices necessarily change until the aggregate of the amounts of money which individuals choose to hold at the new level of incomes and prices thus brought about has come to equality with the amount of money created by the banking system. This, indeed, is the fundamental proposition of monetary theory (p. 85).

The elements of Keynes's monetary analysis discussed above were revolutionary at the time of his writing, and remained marginalized in the decades to come. However, these ideas hold significant implications, though not all articulated by Keynes himself, for the appropriate role of monetary policy in economic management and the analysis of transmission mechanisms via which monetary policy affects the economy. Specifically, the classical approach, which has been rebranded New consensus macroeconomics (see sections 1.8 and 2.5.1) and which has dominated monetary policy decision making in the recent decades, assigns to the central bank the responsibility of setting an interest rate at a level such that savings equals desired investment: it is presumed that bank deposits make loans, which permit entrepreneurs to make desired investments, and it is generally still held, within this mainstream paradigm, that provision of liquidity by the central bank in the absence of sufficient bank deposits would permit the extension of additional loans, thus stimulating economic growth. The framework proposed by Keynes leads us to drastically different conclusions, with a focus on the factors determining aggregate demand and the decision by entrepreneurs to invest; and while an excessively high interest rate may, in effect, constrain investment, a low interest rate will fail to stimulate it in the absence of sufficient effective demand.

While in this brief consideration of the original Keynesian view on money, savings, investment and effective demand we have chosen to focus on the writings of Keynes himself, a number of other early twentieth-century economists have made important contributions to developing an alternative (to the classical school of thought) perspective on these critical concepts. Michal Kalecki, whose contribution is particularly noteworthy, studied (and possibly anticipated Keynes in his work on) effective demand and its relation to investment (Kalecki, 1935, pp. 332-333),⁶ while his acceptance of money endogeneity is evident and fundamental in his macroeconomic analysis (Sawyer, 1998, pp. 11-13). Likewise, Piero Sraffa (1932), who published some of his earlier work prior to Keynes's *The General Theory*, embraced with conviction the theory of endogenous money (pp. 45-48) and the view that loans permit investment, which in turn creates savings (pp. 52-53), to name just two of his unorthodox persuasions.

⁶ For further elaboration and discussion of Kalecki's contribution on this subject, see Assous & Lopez (2010, Chapter 2).

But while the work of the above-mentioned economists was strikingly in line with *The General Theory's* fundamental ideas on the role and nature of (credit) money in the production economy, other elaborations in the name of Keynesianism would subsequently obscure the critical concepts elaborated by Keynes himself. In an influential interpretation of Keynesian ideas on savings and investment, Hicks (1937) proposed the famous IS-LM model, providing what was then seen as a simple and clear-cut way of analysing both the goods and the money markets in the aggregate. In that model, the equilibrium rate of interest is determined by the intersection of the two curves, namely, the investment/savings (IS) and the liquidity preference/money supply (LM) curves. Although Hicks's model has remained central to macroeconomic teaching and policy to this day, it faces a number of challenges that suggest the need for an alternative model that represents more accurately the modern economy and the actual transmission mechanism of monetary policy. To start with, the IS-LM model as well as its more recent alternative, the IS-LM-AS model, which incorporates aggregate supply (AS), both presume an exogenous money supply determined by a central bank which targets monetary aggregates (Romer, 2000, p. 149). A further problematic assumption of the model is that a specific level of the interest rate, the equilibrium rate of interest, is necessarily instrumental to equating savings and investment at a given level of income. Rather, as Keynes has clearly stipulated in *The General Theory*, it is investment that creates the corresponding level of savings, and not the availability of savings that permits a given level of investment. In spite of these and other weaknesses of the IS-LM model, such as its neglect of financial markets and their role in the economy, its simplicity, and the clarity with which it represents key economic relationships made it a popular tool in economic analysis.

1.4 EARLY KEYNESIANS VERSUS MONETARISTS ON MONEY AND THE ROLE OF MONETARY POLICY

The writing and the ideas of Keynes were only the beginning of what in retrospect is referred to as the Keynesian Revolution. Keynes's early followers, such as Hicks, have greatly expanded on his original work, interpreting, elaborating and, to some degree, misinterpreting (as illustrated in regards to the IS-LM model and also as suggested by Modigliani, 1977, p. 2) the theories he proposed. The conclusions of Keynes's analysis of a monetary economy suggested a potentially significant accommodative role for monetary policy in stabilizing the markets, predominantly supported by the liquidity preference theory and Keynes's belief in

complete downward wage rigidity. The role of monetary policy, Keynes believed, was to accommodate the change in aggregate demand and consequent change in demand for money at full employment. Given wage rigidity in the short run, such a policy would be necessary to prevent the re-establishment of equilibrium at a lower rate of interest and employment, which would lead to reduced output and a higher equilibrium rate of unemployment⁷ (Modigliani, 1977, p. 2).

In the two decades following the publication of *The General Theory*, the early Keynesians made a number of additions to Keynes's fundamental framework of analysis, further strengthening the argument for a proactive central bank. Perhaps the most significant and enduring argument was the Phillips curve, proposed by Phillips in 1958, which in its original formulation traces a stable statistical relationship between wage increases and the rate of unemployment (Phillips, 1962, p. 11). While the Phillips curve has frequently been used by Keynesians to support their conviction in the effectiveness of monetary policy in stimulating economic growth, Phillips himself discouraged the use of interest rate policy for these purposes, because he believed its effectiveness was limited by time lags involved in the formulation of correct policy decisions and the economic response to changes in interest rates (*ibid.*, p. 9).

The debate over the existence and the precise nature of the Phillips curve is long lived and is one of the factors driving the clash between Keynesians and monetarists, which characterized the economic policy arena of the 1950s and 1960s, becoming particularly poignant after the publication of *The Quantity Theory of Money* by Milton Friedman in 1956. Although Keynes himself appeared to advocate a purely accommodative role for monetary policy, given his belief that investment and output ultimately depend on effective demand, his followers assigned a greater role to money in determining the level of output. This view was based on a number of arguments that were misrepresentations of Keynes's original ideas (Modigliani, 1977). The arguments put forth by the early Keynesians included the belief that a highly inelastic demand for money results in large changes in such demand in response to changes in interest rates and that investment demand is controlled by 'animal spirits', rather than being a rational response to changes in effective demand. According to the early Keynesians, these among other characteristics of the economy justified an active approach to economic management via both monetary and fiscal policy (p. 3).

⁷ See also Assous & Lopez (2010) for a discussion of Kalecki's contribution to the development of a view that suggests multiple possible employment equilibria (p. 26).

The views of the early Keynesians became the subject of significant criticism with the revival of classical ideas within the monetarist school of thought, represented by a group of economists at the University of Chicago, and most notoriously by the writings of Milton Friedman in the 1950s-1970s. Friedman's view on the workings of a monetary economy led him to advocate deregulation and rules-based monetary policy. Although he believed in the power of monetary policy to influence the economy, he was mindful of the limits of policymakers' ability to make accurate and timely decisions, and believed that proactive economic management was more likely to harm than to help the economy (Hammond, 2011, p. 658). The Great Depression, Friedman (2002, p. 50) argued, "is a testament to how much harm can be done by mistakes on the part of a few men when they wield vast power over the monetary system of a country". Friedman and his colleague monetarists such as Cagan, Klein, Lerner and Selden, who co-authored the famous volume *Studies in the Quantity Theory of Money* in 1956, aimed to create a new paradigm of largely-empirical monetary analysis by exploring and defining a theory of money demand. Their framework incorporated factors such as tastes and income, among others, to generate an opportunity cost of holding money balances, which in turn determined money demand (Angell, 1957, p. 600). A major shortcoming of this framework, however, is that money supply is taken as given, with no importance attached to how money enters the economy or how its quantity is determined. In fact, Friedman's analysis of the effects of monetary policy begins with a 'monetary expansion', with money entering the economy immediately and affecting spending, investment, prices and interest rates (Friedman, 1968, p. 6), with no explanation of the precise mechanism by which this occurs. As in the old quantity theory framework, money supply is exogenous and thus marginalized in the analysis, while it is simultaneously (and paradoxically) viewed as critical in its influence on output in the short run, and on the price level in the long run.

Supporters of the monetarist school of thought thus aimed to reaffirm the validity of the long-run money neutrality axiom, which had been largely annihilated by the Keynesian revolution, presenting "monetarism,' not as a rigid and dogmatic credo, but rather as an ongoing and largely empirically-based approach to macroeconomics and monetary analysis" (Nobay & Johnson, 1977, p. 471). However, there appears to be significant disagreement between several strands of monetarism, which was characterized by an unresolved 'contradiction', in the words of Minsky (1986a, p. 345), considering "that money is neutral but that monetary changes are the main causal factors in the real income and employment changes of business cycles".

In fact, Nobay and Johnson (1977) recognize the existence of four ‘distinct strands’ in the development of monetarist ideas of the 1960s and 1970s, two of which remain largely divorced from the issue of the effects of monetary policy on prices and output (p. 476), and a third which concerns largely the international aspects of monetary theory for an open economy. The fourth, and most scrutinized strand, is associated with the writings of Friedman and a collection of literature supporting the view that ‘money matters’. Even in this regard, however, disagreement abounds, and the Nobay and Johnson (1977) distinguish several distinct strands of thought related to the role of money in the economy. One view, in the spirit of Friedman and his close followers, is that in the short run money is not neutral, which in turn supports the belief in the existence of real economic effects of continued monetary expansion, similar to the view promoted by Hume more than two centuries earlier. An alternative view, however, was built around the rational expectations money models, in which even in the short run money neutrality holds, leaving no role for monetary policy to influence economic expansion (p. 477).

1.5 NAIRU AND THE ROLE OF EXPECTATIONS IN THE MONETARIST FRAMEWORK

A decade after the publication of *Studies in the Quantity Theory of Money*, Friedman elaborated and presented the ‘natural rate hypothesis’ to explain the breakdown of the relationship between inflation and unemployment that characterized the stagflation of the 1970s and which held troubling implications for the presumed existence of a Phillips curve (Farmer, 2013, p. 247). Friedman maintained a distinction, as had the earlier classicals, between real and monetary analysis, arguing for the existence of a Wicksellian natural rate of interest, with the central bank able to influence only a nominal rate, while the real natural rate of interest remained beyond the monetary authority’s control (Friedman, 1968, pp. 8-9). The existence of a natural rate of unemployment also meant, according to Friedman, that in the long run money is neutral. A one-time expansion of the monetary base by the central bank would initially lead to lower interest rates, thus stimulating spending and consequently income, leading to a temporary increase in employment and output and leaving the price level unchanged (short-run money non-neutrality), but eventually prices and wages would adjust, inevitably returning the rate of unemployment to its natural level and lowering output. Any further monetary expansion at the prior rate would have no real effects on the economy and further temporary increases in employment and output could be achieved only by ever-greater increases in the rate of monetary expansion (*ibid.*, p. 10).

This natural rate of unemployment is thus referred to as the non-accelerating inflation rate of unemployment (NAIRU), since within the monetarist framework deviations from this rate are inevitably associated with an increasing inflation rate. The apparent breakdown of the Phillips curve could, however, be explained by the public's inaccurate inflationary expectations, which get locked into nominal wage contracts, creating a short-run trade-off between *realized* inflation (rather than actual wage inflation used in the original version of the Phillips curve) and unemployment. Since, with time, expectations errors are corrected, employment will tend towards its natural rate (*ibid.*, pp. 10-11). Phelps (1967), writing in the same period, though independently of Friedman, came to similar conclusions regarding the role of inflationary expectations and the resulting nature of the Phillips curve (Farmer, 2013, p. 247). The work of Friedman and Phelps led to the creation of the so-called expectations-augmented Phillips curve, which has remained central to monetary theory to this day.

Entrenchment of the idea of a natural rate of unemployment in monetary theory has led to a general neglect of the concept of unemployment in modern monetary policy models. However, the experience of the Great Recession and recent advances in monetary theory have provided evidence in favour of Keynes's view of high unemployment as a state of equilibrium, in contrast to the monetarist view described above. In fact, the existence of an expectations-augmented Phillips curve is also challenging to justify at a time of unprecedented monetary expansion (accompanied by initial widespread expectations of eventual inflationary pressure), persistently low realized inflation (with a risk of deflation) and continuing high unemployment. It is also not inconsequential that the concept of a natural rate, whether it be of interest or unemployment, is of little use in policy making, as calculating a natural rate of either one or the other is practically impossible. Even proponents of the use of the natural rate of interest in the design of monetary policy acknowledge this significant challenge (Barsky et al., 2014).⁸

Monetarism thus dominated the monetary policy arena in the United States during the 1960s and 1970s against a backdrop of rising inflation rates, which peaked during the tenure of Federal Reserve Chairman Arthur Burns in the 1970s. In the spirit of monetarist theory, the Federal Reserve aimed to bring inflation under control via use of tight monetary policy but failed to achieve its target, with high interest rates eventually causing a recession combined with moderately high inflation in the late 1970s. The targeting of monetary aggregates, as prescribed by monetarist theory, proved to be impossible and the Federal

⁸ A rejection of the concept of a single, 'natural' rate of interest can be traced back to Sraffa (1932, pp. 49-51).

Reserve moved on, in the 1980s, to indirect reserve targeting via frequent alterations in the federal funds rate, also in this case without much success (Fullwiler, 2013, p. 180).

In spite of the failure of monetary policy, intellectual developments in the field of monetary theory during the 1970s continued to support the monetarist approach to policy implementation. Inspired by the work of Milton Friedman and Paul Samuelson (Lucas, 1995), Robert E. Lucas Jr. began a line of research that in 1995 would earn him a Nobel Prize and which would shape developments in monetary theory for decades to come. In his first seminal publication, "Expectations and the neutrality of money", Lucas (1972) modelled the idea of rational expectations, originally proposed by Muth (1961), in which all economic agents use available information in the most efficient possible way. His paper also highlighted the differing economic impact of anticipated versus unanticipated monetary policy, along the lines of Friedman's earlier analysis, leading him to stress the importance of predictability of monetary policy (more precisely, the expansion of the monetary base at a constant rate, referred to as the 'k-percent rule') (p. 119) and the link between business cycles and unanticipated monetary policy disturbances. Lucas's work aimed to resolve the paradox of the monetarist perspective, whereby money is viewed as neutral yet monetary disturbances cause real fluctuations in produced output.

The explanation that Lucas provided was grounded in the view that economic agents are rational, yet inadequate information on the state of the economy limits their ability to distinguish between real and monetary disturbances, leading to real movements in output (pp. 121-122). Lucas's analysis presumes an external nature of monetary disturbances, that is, money exogeneity, with the impact of monetary disturbances on real output depending on the nature in which monetary 'injections' occur (Chari, 1999, p. 5). In an analysis of Lucas's work published in the *Quarterly Review* of the Federal Reserve Bank of Minneapolis, Chari (1999) compares, in the context of Lucas's model, the impact of monetary injections of several kind, including "handing out money to old people" in equal amounts versus in proportion to their existing holdings, the latter being the assumption adopted by Lucas in his model (*ibid.*, pp. 5-6). Such assumptions prove problematic in their application to the analysis of the modern monetary system, because in practice the monetary authorities do not have the ability to increase directly the monetary holdings of individuals (a prerogative of fiscal policy), nor, as mentioned earlier, do they control monetary aggregates.

In fact, despite its general acceptance in academic and policy circles, the monetarism of the 1970s was not without its influential critics. Franco Modigliani, although a monetarist by many theoretical counts (such as his unwavering belief in long-run money neutrality),

challenged the work of Lucas and Friedman, arguing instead for the importance of the use of stabilization policies by both monetary and fiscal authorities (Modigliani, 1977). His arguments were based on the belief that the rational expectations hypothesis is inconsistent with historical evidence, which provides cases of prolonged and significant deviations from the natural rate of unemployment (p. 6). Modigliani provided evidence for Keynesian wage rigidity and for the rise of involuntary unemployment (increase in layoffs and decrease in voluntary quits), arguing against Friedman's model of an economy with no involuntary unemployment (p. 7). Further, Modigliani's statistical work illustrated a lack of correlation between monetary and economic stability, thus challenging monetarists' central policy prescription of predictable and stable monetary expansion (p. 12). Crucially and correctly, Modigliani's work, in collaboration with Rasche and Cooper (1970), underscored the central role played by the commercial banking sector and public demand in determining money supply. The authors hypothesized that, while banks would generally aim to accommodate a rise in demand for commercial loans by customers, they would be powerless to prevent the process of deleveraging in the face of declining borrower demand (p. 181).

1.6 THE ROLE OF LEVERAGE & NON-NEUTRALITY OF MONEY IN THE MINSKYIAN FRAMEWORK

Concern with the role of inevitable deleveraging during economic downturns, driven by falling aggregate demand, was also the central tenet of the financial instability hypothesis developed by Hyman Minsky, another fervent critic of monetarism in the 1970s. Minsky's hypothesis draws on the writing of Keynes, relying on Keynes's definition of money as the mechanism that connects financing between the present and future time periods, in contrast to the classical view of money as a tool allowing for the exchange of commodities in the present (Minsky, 1992, p. 3). Banks are key players in Minsky's model, providing leverage to households and businesses and playing a crucial role in the validation of aggregate demand by their willingness, or unwillingness, to extend loans or to roll over liabilities towards the end of the 'upswing' phase of the leverage cycle, based on their informed evaluation of current risks, economic performance and expectations of future profits (*ibid.*, p. 4). This view stands in stark contrast to the ideas behind the quantity theory of money, where an exogenously-supplied quantity of money is linearly related to the price level, and provides a far more insightful and accurate description of the modern monetary economy. According to the financial instability hypothesis (FIH), the quantity of money expands endogenously via

the granting of credit during economic upturns in ever-more speculative units of debt, “which the current performance of the economy either validates or invalidates” (*ibid.*, pp. 4-5).

Minsky’s hypothesis thus brings centre stage a number of factors that are absent in the classical approach to economic analysis. The structure of liabilities, the nature and complexity of institutions, as well as the intertemporal aspect of money and profit creation play a major role in business cycles that characterize the performance of modern capitalist economies. Minsky’s analysis is also instrumental to understanding how monetary policy may influence the economy. Specifically, while business cycles are caused by an endogenously-generated process of debt accumulation, monetary authorities can contribute to a precipitous deleveraging by untimely efforts to control inflation when the economy is in the final stage of the upswing characterized by a significant accumulation of speculative finance units in the structure of liabilities. As the authorities engage in monetary tightening, speculative units, made up of ‘interest only’ loans, turn to Ponzi units, which represent highly-destabilizing leverage, since cash flows from operations cover neither the interest nor the principal payments of such loans in the aggregate. As investors rush to sell out of their positions to cover due interest payments, asset prices collapse and debt values evaporate as the economy deleverages (*ibid.*, p. 8). Minsky thus argued for the non-neutrality of money, in that money is created by banks in the form of debts in the process of financing entrepreneurial activity, and must be validated by the successful creation of profit from the activity it finances (Minsky, 1986a). A decrease in investors’ aggregate profit and cash flows causes ballooning aggregate debt, which becomes increasingly difficult to service and which eventually leads to an economy-wide deleveraging. Likewise, a decreased willingness of banks to engage in money creation, as they correctly or incorrectly evaluate expected future profits and mounting risks, has an effect similar to a monetary tightening, as represented by a shift in the money supply curve in the classical analysis. Money, far from being neutral, is thus a central element influencing economic performance.⁹

1.7 MARGINALIZATION OF MONEY IN THE NEW KEYNESIAN AND NEW MONETARIST COMPROMISE

Minsky’s ideas on money and the role of monetary policy thus aligned with the original ideas of Keynes and Schumpeter, and stood in complete juxtaposition to the ideas of monetarism.

⁹ In section 5.2.3 we elaborate further on Minsky’s hypothesis and integrate it into an alternative framework for the analysis of monetary policy’s role in promoting economic growth, as developed throughout the dissertation.

By contrast, a wave of research under the umbrella name of New Keynesianism, which gained popularity in the 1980s, attempted to reconcile the ideas of the Keynesian and monetarist camps. The New Keynesian framework incorporated a short-run Phillips curve, money short-run non-neutrality resulting from sticky prices, and rational expectations, with one line of research dedicated to understanding how rational expectations can coexist with markets that in practice do not always clear (Mankiw, 2006, p. 9), and used innovative, modern modelling methodology (Clarida et al., 1999, p. 1662), thus further distinguishing itself from the ‘old’ Keynesian approach to analysis. The fundamental implication of this framework for monetary policy, according to its proponents, was that in the short run, policy decisions can exert a non-trivial influence on the performance of the economy and, in monetarist spirit, that monetary policy should aim for credibility and predictability, with inflation targeting and commitment to a policy rule believed to be the best approach (*ibid.*, pp. 1661-1663). The New Keynesian perspective is represented notoriously by the work of Michael Woodford, most elaborately in his book *Interest and Prices: Foundations of a Theory of Monetary Policy* (2003), which in name and general principles aimed to echo the work of Knut Wicksell (1965). Woodford abandoned monetary analysis based on control of monetary aggregates in favour of the Wicksellian principle of interest rate management and focused on the central role played by the relationship between the prevailing and the natural rate of interest. However, while Wicksell (1965) had illustrated in his writing a fundamental appreciation of the institutional nature of money, as discussed previously, and had, to some degree, stressed the role of endogenously-created money on economic performance, Woodford appeared to de-emphasize such factors in his earlier work. In an article entitled “Doing without money: controlling inflation in a post-monetary world”, Woodford (1997) initially defined money as a tool for eliminating transactions frictions, as in barter economy models of the old monetarist tradition. Maintaining a distinction between ‘money’ and ‘assets’, he argued that financial innovation would diminish the role of money in the economy, with “[t]he only natural limit to this process [being] an ideal state of frictionless financial markets, in which there is no positive demand for the monetary base at all” (p. 1). He stressed the irrelevance of the quantity theory of money in an economy with no stable money demand function and advocated an analytical approach to the formulation of optimal monetary policy that abstracts entirely from the concept of money, a ‘cashless’ economy with a central bank that successfully stabilizes the rate of inflation by mitigating the effects of real disturbances that cause deviations in the natural rate of interest from the prevailing policy rate of interest (p. 52). Examples of Woodford’s later work suggest a significant shift in his

perspective, to the extent that credit frictions (which inevitably admit the institutional nature of money), the role of financial intermediation, and the existence of multiple interest rates gain centre stage in analysis (Woodford, 2010).

Although in some respects innovative, the New Keynesian framework did not introduce any revolutionary views on the role of money, or the impact of monetary policy on the economy. Ironically, the importance of the role of money was emphasized to a far greater extent in the New monetarist framework, which also developed in the 1980s and is represented by the work of Williamson and Write (2010). While borrowing some elements of monetary theory from the writings of Milton Friedman and the old monetarist school of thought, New monetarism stressed the importance of explicitly modelling monetary frictions¹⁰ and understanding the role of financial intermediation¹¹ in the increasingly innovative and complex modern economy (pp. 266-267), while de-emphasizing the importance of sticky prices as the cause of money non-neutrality necessitating Keynesian-style monetary stabilization policies (p. 268). In spite of an appreciation for the role of financial intermediation, particularly the granting of credit by the banking sector, the New monetarist perspective appears to hold on to the traditional monetarist axiom of money neutrality, thus undervaluing the importance of the endogenous nature of money. The perspective, as represented by Williamson and Write (2010), assigns to financial intermediaries the important role of efficient capital allocation, correctly so, but views deposited savings as the necessary starting point of investment (p. 294), again illustrating a lack of appreciation for the loans-create-deposits view that is most applicable to the modern banking sector, as argued previously. In fact, there does not appear to be a consistent definition of money in the New monetarist literature. While Williamson and Write (2010) appropriately argue for the inclusion of assets in the definition of money, based on the fact that assets are frequently used in financial transactions and play a major role in the liquidity transformation and allocation that banks undertake on a daily basis (p. 294), Kocherlakota (1997), in a much-cited paper that can be classified as belonging to the New monetarist perspective, argues for a definition of money that relegates it to a purely historical record-keeping function. Brushing aside classical definitions of money as a store of value, a medium of exchange or a unit of account, he argues that, in an environment with perfect record keeping (p. 250), money could be eliminated entirely from models of the monetary system. In

¹⁰ In the New monetarist framework, important monetary frictions include the double coincidence of wants, private information, limited commitment and imperfect record-keeping.

¹¹ This refers to the role of banks in liquidity transformation and insurance and their ability to minimize monitoring costs.

the words of the author, “money is equivalent to a primitive form of memory” (p. 233). Such a limited definition of money clearly could not coexist with the tenets of, for example, Minsky’s instability hypothesis, in which money, far from representing past transactions, is a claim on future profits yet to be generated by current activities of entrepreneurs, and where money as debt is by nature of an unstable value that is to be validated by the future performance of the economy (or wiped out by a deleveraging process in the aggregate).

1.8 EMERGENCE OF THE NEW CONSENSUS MACROECONOMICS FRAMEWORK

The New Keynesian and the New monetarist perspectives, while significantly at odds with each other on a number of fundamental points, are both critical in that they lay the foundation for the development of the New consensus macroeconomics (NCM) framework, discussed in greater detail in the next chapter, which has to this day remained the theoretical and practical mainstream in macroeconomics. In something of a compromise, the NCM framework aims to reconcile the ideas of the New Keynesian and the New monetarist schools of thought, adopting from both schools the key ideas, such as nominal rigidities to explain monetary policy effectiveness in the short run, key in New Keynesian models, and the importance of monetary frictions and rational expectations, as emphasized by New monetarist literature. Short-run non-neutrality of money in the framework is addressed by credible interest rate management, which aims to minimize fluctuations of the policy rate of interest away from the natural rate, while in the long run monetary policy is held to be neutral, influencing only the inflation rate (Argitis, 2011, pp. 91-92). Based on the paramount work of Kydland and Prescott (1977) in which the authors introduced the concept of time inconsistency by illustrating how monetary policy viewed as optimal in one time period (given a set of current expectations for the future) may be suboptimal in the subsequent period because of changing economic circumstances, monetary policy based on rules rather than discretion is advocated in the framework. As was the case with both the New Keynesian and the New monetarist schools, the NCM literature made no novel or insightful contributions to the economic profession’s understanding of the nature and the role of money in a monetary economy, largely maintaining an analytical framework based on the classical quantity theory of money (Fontana, 2007, p. 52). In fact, the role of money is generally limited to its usefulness as a unit of account (Argitis, 2013, p. 486).

1.9 ENDOGENOUS MONEY IN THE POST-KEYNESIAN FRAMEWORK

It is clear from our survey and evaluation of the various mainstream macroeconomic frameworks undertaken thus far that, with few exceptions, mainstream monetary economists have defined money as exogenous and neutral in the long run. The debate on the role of monetary policy in influencing the economy has focused exclusively on short-term price and wage rigidities, as in the Keynesian framework, broadly defined. The post-Keynesian school of thought, discussed in detail in the remainder of this chapter, contrasts starkly with the mainstream views presented in spite of its affinity in name to the Keynesian tradition, and although it has yet to attain mainstream status in academic teaching and literature, it provides an analytical framework that most accurately describes today's monetary economy. For this reason, the ideas the post-Keynesian perspective encompasses will provide the foundation for the analysis undertaken in this dissertation.

Although many of the ideas that are fundamental to the post-Keynesian framework began to take shape in the economics literature of the 1950s (Rochon, 2007), reference to a coherent framework as an alternative to the mainstream has its early roots in the work of Eichner and Kregel (1975), who presented the burgeoning paradigm as having “the potential for becoming a comprehensive, positive alternative to the prevailing neo-classical paradigm” (p. 1294). The establishment of the *Journal of Post Keynesian Economics* in 1978 gave a formal literary space for economists affiliated with this perspective to present their ideas in a dedicated review. Eichner and Kregel (1975) originally highlighted a number of characteristics of the then-new perspective that distinguish it from the mainstream classical paradigm. Critically, the post-Keynesian approach focuses on economic growth dynamics, emphasizing the importance of analysing “an economic system expanding over time in the context of history” rather than analysing a point in time of a system frozen in a static equilibrium model. Thus, expectations about the future, as well as the impact of past behaviour, are key to the evolution of the economy in the post-Keynesian analytical framework (*ibid.*, p. 1294). Also crucial to post-Keynesian analysis is the idea that the modern economy is a ‘monetized production economy’: money, as well as a range of financial institutions such as commercial banks and investment firms, are at the heart of the system and must therefore feature as an integral part of any model of the economy. Investment is viewed as the main factor determining the level of produced output, and hence a thorough understanding of the determinants of the rate of investment is key to evaluating economic performance (*ibid.*, pp. 1300-1302). More generally, Eichner and Kregel (1975)

argued that the goal of post-Keynesian theory is to understand the economy on the basis of empirical observation, in contrast to the goal of neoclassical theory, which is to model a socially optimal equilibrium based on predetermined assumptions inherent to the model (*ibid.*, p. 1309).

As correctly argued by Eichner and Kregel (1975), money is a fundamental element of the modern economy and thus a thorough understanding of its nature and role is imperative in forming appropriate foundations for the analysis of monetary policy effectiveness. The post-Keynesian view of money stands in stark contrast to its definition and treatment in the mainstream classical paradigm, which views money as an exogenously-supplied medium of exchange, or unit of account, the importance of which is limited to its role in overcoming the ‘double coincidence of wants’, imperfect record-keeping and limited commitment problems, and which marginalizes the role of money in both theoretical and empirical analysis. In post-Keynesian literature, money holds centre stage in both theoretical debates and empirical models, and, most critically, at the heart of post-Keynesian analysis is the concept of money endogeneity, touched upon in earlier discussions.

Money endogeneity, though clearly not originating in the work of post-Keynesian theorists,¹² is central to the post-Keynesian paradigm and has been elaborated in its context to a far greater degree than in any earlier work (see Davidson, 1986, Kaldor,¹³ 1970, and Robinson, 1969, 1970, who are amongst the early post-Keynesian scholars frequently given credit for developing the concept of money endogeneity within this framework).¹⁴ While there is some disagreement amongst post-Keynesians as to whether money has always been endogenous or whether money endogeneity is the result of a lengthy process involving the evolution of monetary institutions (see the evolutionary versus revolutionary post-Keynesian debate critically discussed by Rochon & Rossi, 2013), all post-Keynesians without exception agree that money endogeneity is a fundamental and indisputable characteristic of the modern economy.

¹² Recall our previous discussion of Kalecki, Keynes, Schumpeter, Sraffa and Wicksell, all of whom wrote well before the establishment of the post-Keynesian school of thought to which one could claim affiliation.

¹³ See also an excellent exposition of Kaldor’s contributions to the development of theories on endogenous money, effective demand and economic growth in Colacchio & Forges Davanzati (2017).

¹⁴ See also Rochon’s (2001) insightful analysis of the unique and important contribution of Robinson and Richard F. Kahn, another renowned Cambridge economist, in the elaboration of a well-defined post-Keynesian theory of endogenous money.

1.10 THE ROLE OF CREDIT IN THE MONETARY PRODUCTION ECONOMY

The nature of money endogeneity, as defined in the post-Keynesian framework, is intricately linked to the role of credit in the modern economy.¹⁵ As explained by Lavoie (1984), a principle contributor to the development of the post-Keynesian theory of money and central banking, the expansion of the money stock, rather than resulting from an exogenous injection of money by the central bank, as in classical analysis, stems from the granting of credit by the banking sector, and thus explains neither the level of employment, nor prices. In fact, not only is the attempt by a central bank to control monetary aggregates futile; it is, furthermore, likely to disrupt financial markets and destabilize the economy (pp. 775-776).

Although the academic mainstream (to wit, neoclassical theory) has largely refused to integrate money endogeneity, as defined by post-Keynesian theory, into its theoretical and empirical framework, it is a matter of fact that most central banks around the globe have relinquished any hope of successfully controlling monetary aggregates and now follow an exclusive policy of interest rate management. It is possible, and necessary, to take this one step further by illustrating that monetary aggregates are, in the words of Lavoie, “a residue” (*ibid.*, p. 775), and cannot be controlled by a central bank even under an interest rate targeting regime. Attempts at indirect targeting of monetary aggregates by the US Federal Reserve via frequent changes in the federal funds rate during the period 1979-1982 were largely unsuccessful (Fullwiler, 2013, p. 180). The essence of money non-neutrality stems from this endogenous characteristic of money, the nature of which is far more complex and intricate than its definition and treatment in mainstream classical and neoclassical theory implies, and necessitates an expansion of what is viewed as money, and how money is defined in theoretical and empirical models.¹⁶

The age-old debate on how to define money received renewed attention with the presentation of a ‘New view’ in the early 1960s, discussed by James Tobin, which began to erase the traditionally clear distinction between money and assets, and to consider yields, the structure of interest rates, and the supply of credit as the key variables in the determination of economic performance (1963, pp. 3-4). A supporter of this view, Tobin criticized the mainstream view of money as “the ‘hot potato’ of a children’s game; one individual may pass

¹⁵ While convincing arguments have been made in the post-Keynesian literature for the revolutionary nature of money endogeneity (see Rochon & Rossi, 2013), the indisputable uniqueness of the institutional structure of the contemporary economy necessitates a focused analysis of the present day nature of credit money, hence reference to the ‘modern economy’ throughout the discussion.

¹⁶ For a thorough empirical analysis of the money creation process in the G-7 economies in the context of eight different schools of thought, which lends support to the post-Keynesian view of money endogeneity, see Panagopoulos and Spilotis (2008).

it on to another, but the group as a whole cannot get rid of it”, a view which implies that “[if] the economy and the supply of money are out of adjustment, it is the economy that must do the adjusting” (*ibid.*, p. 2). Rather, he appropriately argued for a distinction between money that enters the economy via government spending and cannot be extinguished, and bank-created money, which results in the simultaneous booking of an asset and a liability on the bank balance sheet, and can be eliminated from the economy via the repayment of credit or the writing off of non-performing loans (pp. 11-12).

Within the post-Keynesian framework, an accurate and succinct definition of money is offered by Rochon and Rossi (2013, p. 211), who describe money as “the means of payment that is required to settle any kind of debt obligation finally”. The authors underscore several points of general agreement amongst post-Keynesian theorists with regards to the endogenous nature of money. First, the creation of money is demand driven and occurs via the extension of bank credit to all creditworthy customers, fluctuating with the economic cycle and corresponding needs of production (recalling here the argument put forth by Keynes on the importance of entrepreneurs’ expectations for future effective demand). Second, bank lending does not face constraints of central bank reserve availability (*ibid.*, p. 212), as such reserves are always provided on demand at a pre-determined interest rate. To these points can be added another related central tenet of post-Keynesian monetary theory: it is loans that create commercial bank deposits, rather than deposits creating loans, as sustained by neoclassical theory, and the central bank stands ready to provide the banking sector with any amount of reserves to cover the shortage that such lending creates (Lavoie, 1984, p. 785).

While this concept remains of controversy within the academic sphere, as it clearly challenges the idea of money exogeneity and the principle of the quantity theory of money that remains fundamental in the neoclassical paradigm, recent empirical and institutional analyses conducted by research departments of the most prominent central banks confirm the accuracy of the post-Keynesian perspective on this matter. In an article published in the *Bank of England Quarterly Bulletin*, McLeay et al. (2014) describe the official point of view of the Bank: “In reality, neither are reserves a binding constraint on lending, nor does the central bank fix the amount of reserves that are available [...]. Banks first decide how much to lend [...]. It is these lending decisions that determine how many bank deposits are created by the banking system” (p. 15). Similarly, in an empirical study of the US banking system, Carpenter and Demiralp (2012) find that there is no statistical link between reserves and

money, or between base money and bank lending, or between deposits and lending,¹⁷ and that, contrary to neoclassical theory, a monetary tightening actually results in an increase in bank lending, as businesses struggle to obtain non-bank funding and thus increase the demand for bank loans (p. 63).

1.11 DETERMINANTS OF BANK LENDING WITHIN THE ENDOGENOUS MONEY PERSPECTIVE

The arguments just presented necessitate an examination of the question of what, precisely, determines the supply of credit money if not the availability of bank deposits and central bank reserves, or put differently, what are the main factors influencing bank lending. As stressed by Fullwiler (2013), a complete appreciation of bank lending within the endogenous money perspective requires a clear understanding of banks' balance sheet accounting, of why banks lend and of how commercial banks' business models allow them to function as successful profit-making institutions.¹⁸ The importance of leverage has already been discussed in the context of Minsky's financial instability hypothesis, which sketches out a number of critical characteristics of modern capitalism, such as the role of debt and leverage in the determination of economic fluctuations. Bank leverage is also key to the success of the business model of commercial banks, which frequently aim to maximize their share of deposits as the cheapest, and hence most profitable, source of liabilities available to them (Fullwiler, 2013, p. 173). Acceptance of existing customer deposits, therefore, is a choice of strategy, the aim of which is to maximize long-term profitability, rather than one of necessity. It can also be seen as a service offered with the aim of attracting customers, who may then engage in other, more profitable, business transactions with the bank.

The decision to extend a loan is thus unrelated to the availability of deposits on a bank's balance sheet and the granting of a new loan results in the simultaneous booking of a deposit liability, which may be drawn down or transferred to another bank by the customer to whom the loan is originally extended. The decision to originate a loan is one of profitability, and involves an evaluation of the borrower's creditworthiness, collateral, if any, available to back the loan, an estimation of the expected return on investment if the loan funds a specific project, and the impact of additional lending on the liabilities structure of the bank, which is governed by certain regulatory constraints (for a more detailed exposition of the determinants of bank lending, see section 4.1.3).

¹⁷ These findings are not surprising in the framework of post-Keynesian monetary theory and are discussed in greater detail in section 4.1.

¹⁸ This subject is elaborated upon in greater detail in Chapters 2 and 4.

Banks must also consider their lending decision in the context of the loan activity of the banking sector as a whole. As McLeay et al. (2014, p. 18) explain, “[i]n order to make an extra loan, an individual bank will typically have to lower its loan rates relative to its competitors [...]. And once it has made a loan it may well ‘lose’ the deposits it has created to those competing banks”. Of course, deposits are not the only source of liabilities available to banks, which, on the contrary, can never find themselves short of funds necessary to meet daily liquidity needs. A highly developed and liquid money market permits banks to meet most of their liquidity needs via collateralized or uncollateralized borrowing, which ranges from one day to one year in maturity. A more expensive alternative, used by banks in rare cases where money markets are unable to meet their borrowing needs, is the central bank’s discount window, which generally applies a penalty rate for collateralized short-term borrowing.¹⁹ The textbook presentation of bank deposits, a said necessity because of reserve requirements, as the limiting factor on the granting of loans, has been entirely discredited by the virtual elimination of reserve requirements in the United States (Carpenter & Demiralp, 2012, p. 61), the fact of retrospective calculation of reserve requirements²⁰ and the invention of deposit sweeps.²¹

1.12 INSTITUTIONALISTS AND CIRCUITISTS ON ENDOGENOUS MONEY CREATION

While the banking sector has the unique prerogative to expand the money supply via the extension of bank loans, the role of corporations, in addition to the banking sector, in the process of temporary credit extension also deserves attention. As pointed out by Lavoie (1984), loans of the corporate sector can temporarily substitute bank loans if demand for borrowing is greater than the supply of loans by the banking sector (p. 779). This subject is dealt with in depth by economists representing institutional economics theory (associated most notably with the writings of Joseph Stiglitz), which similarly to post-Keynesian theory draws significantly on the work of Keynes and Minsky, and emphasizes the endogenous nature of credit money. Institutional economics theorists, like post-Keynesians, are critical of mainstream (neoclassical) monetary theory, particularly of its reliance on the representative

¹⁹ For detailed information on the Federal Reserve’s lending to depository institutions, see http://www.federalreserve.gov/monetarypolicy/bst_lendingdepository.htm.

²⁰ In the United States these are calculated based on a 14-day reserve maintenance period. For more information, see <http://www.federalreserve.gov/monetarypolicy/files/reserve-maintenance-manual.pdf>.

²¹ Deposit sweeps permit banks to temporarily ‘sweep’ excess deposits into special accounts offered by a number of investment banks, eliminating the need to include them in the reserve requirements calculation for that period (Alloway, 2012).

agent (RA) model (perfect information, rational expectations, and profit maximizing behaviour), as well as of its neglect of financial markets, informational imperfections, the role of debt, leverage and the process of economic deleveraging (Stiglitz, 2011, p. 598). The institutional economics perspective highlights the inadequacy of the classical transactions-demand monetary theory, which models money demand as a function of national income, in light of a number of fundamental characteristics of the modern monetary economy, such as the predominance of non-income generating transactions (like sales and purchases of financial assets) and the nature of credit money (Stiglitz & Greenwald, 2003, pp. 14-18), the creation of which, by definition, anticipates the act of production in the economy.

Heterogeneity of credit is another central theme in the work of institutional economics theorists and, taking the ideas of Lavoie one step further, helps to explain the importance of inter-firm credit and the domino bankruptcy effect that a fall in the propensity to lend amongst firms tends to create. Stiglitz and Greenwald thus argue for a “new form of credit multiplier”, as opposed to the neoclassical idea of the money multiplier, whereby the marginal effect on the economy of one firm refusing to extend credit to another multiplies via a ripple effect that impacts all credit-dependent firms in the supply chain (*ibid.*, p. 140). The monopolistic nature of the market for credit, the significant costs and the fragility of information capital (resulting from the difficulty of gathering information in relation to each individual borrower) contribute to the determination of credit supply, which at times of mounting financial tensions (a subject that benefits from a detailed elaboration in the context of Minsky’s instability hypothesis), can be insufficient to satisfy aggregate demand for credit.

While the institutional economics perspective should be accredited with developing a framework original in its incorporation and detailed study of informational frictions, the Circuitist tradition must be given acclaim for its significant contribution to the development of theory on the relationship between banks, firms and households, and for its informative description of bank money as a flow, “whose instantaneous circuit has a stock of income as its object”, and the critical concept “that banks create the flow but not its object, which is intimately related to production” (Rossi, 2009a, p. 38). This distinction between ‘money’, which is issued by the banking sector and provides a numerical basis on which to measure the value of economic output, and ‘income’, which is created by “the efforts accomplished by workers whose outcome (that is, produced output) the banking system monetises when a firm uses the credit line that a bank has granted to it for that purpose” (*ibid.*, p. 38) is fundamental to the analysis of monetary policy transmission, as will become evident in later discussions.

Although historically viewed as a perspective standing at odds with the post-Keynesian analytical framework, given the total absence of a central bank in its analysis of money endogeneity, Rochon and Rossi (2007, p. 540) argue that Circuitist theory is most instrumental when combined with post-Keynesian analysis, resulting in a “comprehensive theory of endogenous money that rests on the tripartite relationship at the core of monetary circuit analysis, namely, the relationship between the payer, the payee and the banking system”.²² The theory of the monetary circuit is developed in great detail in the work of Graziani (2003), in which he outlined the stages of the circuit that characterize, according to this perspective, the endogenous nature of money expansion, a process that involves the extension of credit money by the banking sector, its flow in the markets and role in the process of production by firms, and finally its repayment and consequent destruction by the banks (p. 17).

In a critical evaluation of neoclassical and traditional Keynesian analyses, Graziani argues that “[t]he path of the economy is influenced in a much deeper way by money and credit flows, by the investment decisions emerging from the negotiations between banks and firms, by the proportions in which aggregate production is divided between consumption and investment goods, and by the consequent distribution of national income between wages and profits” than either of the aforementioned perspectives assume (p. 22). Graziani found greater affinity of the Circuitist perspective to the view of the ‘second generation’ post-Keynesian scholars such as Davidson and Minsky, who emphasized in their analysis the importance of money supply as well as financing opportunities and constraints faced by credit-dependent firms (p. 24).

1.13 RE-EVALUTATING THE CAUSES OF INFLATION WITHIN THE POST-KEYNESIAN FRAMEWORK

The endogenous view of money as described by post-Keynesian theory more generally is important not only because it reflects most accurately the process of money creation and utilization in the modern monetary economy (see Terzi, 2012, Ch. 4), but also because acceptance of money endogeneity significantly alters the theoretical building blocks in all spheres of monetary analysis, including, as is relevant to the current discussion, the evaluation of monetary policy transmission mechanisms and the effectiveness of monetary policy. For example, in a post-Keynesian framework with endogenous money, analysis on the causes of inflation, a major consideration in the formation and implementation of monetary

²² The role and importance of the central bank is more thoroughly discussed in Chapter 2.

policy, stands in stark contrast to the evaluation of the subject in the neoclassical paradigm. Given the reliance of the neoclassical view on the quantity theory of money to explain the relationship between exogenous increases in the stock of money and changes in the price level, inflation in this framework is, in the famous words of Milton Friedman, “always and everywhere a monetary phenomenon”, with no link to changes in ‘real’ economic variables, a belief that remains one of the ‘Nine Basic Principles’ of macroeconomics in neoclassical theory (Mishkin, 2011, pp. 3-4).

Presumed success of inflation targeting under the NCM policy framework received much praise in the years before the 2008 crisis. The decades following the price instability of the 1970s, a period which has been termed the Great Moderation, were characterized by low inflation rates, rapid economic growth and a significant reduction in business cycle volatility (Bernanke, 2005, p. 277). Until the financial crisis of 2008 and the ensuing recession, this empirical evidence offered convincing support for the success of the NCM monetary policy framework, which has dominated the central banking policy arena since the 1990s. Praise of the inflation-targeting regime has been widespread in policy circles, in spite of convincing empirical evidence that the moderation in business cycle volatility, and hence in the rise of consumer prices as measured by the consumer price index, is the result of decreased severity of global shocks during recent decades (Stock & Watson, 2003). The post-crisis years have further challenged the prevailing policy model, which emphasizes inflation targeting, policy reaction functions based on a Taylor-type interest rate rule, and the concept of a natural rate of interest (Argitis, 2011, pp. 91-92), particularly in light of an unprecedented expansion of the monetary base under so-called ‘quantitative easing’ programmes, coupled with persistently low inflation rates, as defined by neoclassical theory, and slow economic recovery. Clearly, the quantity theory relation that links an expansion of the stock of money to a rise in the price level has not been upheld in the nine years since the collapse of Lehman Brothers and the beginning of radical monetary intervention by a number of central banks in the developed world, most notably the Fed and the Bank of England (BoE).

Post-Keynesian theory has offered alternative explanations for the causes of rising consumer prices, as well as their subdued behaviour during the decades of the Great Moderation.²³ Perry and Cline (2013) examine three hypotheses, namely ‘good policy’, ‘good luck’ and ‘structural changes’, to explain the Great Moderation in the context of monetary

²³ Kalecki has notably made an important early contribution to the development of the post-Keynesian perspective on inflation within his theory of prices. Specifically, Kalecki modelled prices as cost determined (plus mark-up, determined by prevailing production and labour market conditions) rather than demand determined (Sawyer, 1998, pp. 3-4), with clear implications for inflation theory.

policy in the United States. To test their hypotheses, they construct a post-Keynesian model based on endogenous money and cost-push inflation, with inflationary pressure generated by wages, commodity prices, the real exchange rate, and wage resistance to past inflation. They reject the natural rate of unemployment and the Wicksellian natural rate of interest concepts, both of which they believe are empirically and theoretically questionable (pp. 8-9). The empirical results of their study suggest that falling wages and import prices have the strongest explanatory power for the decreased inflationary pressures witnessed after the 1970s, thus rejecting the alternative ‘good policy’ and ‘good luck’ explanations. Another empirical study by Atesoglu (1997) found that the post-Keynesian wage-cost markup model (which asserts that inflation is caused by excess increases in wages over increases in productivity) is superior to the quantity theory of money, the Phillips curve and the expectations-augmented Phillips curve in explaining inflation in the United States in the post-World War II period. In fact, in spite of the complexity of models used to inform policy-makers on the likely path of inflation rates²⁴ as well as the wide range of factors used in the central bank’s monetary policy committee’s decision-making process,²⁵ the absence of wage pressures has been singled out as the dominant factor in the setting of the interest rate by the Bank of England (Cadman & Giles, 2014) and the Federal Reserve (Phillips, 2013).

While a consideration of changes in relative prices (particularly changes in the consumer price index) has significant value in the formation of monetary policy, caution is warranted in defining such changes as ‘inflation’. An insightful examination of inflation from an endogenous money perspective, put forth by Rossi (2007), has as its starting point the view that “monetary as well as relative prices are surface phenomena. As such, they do not contain enough relevant information to assess whether the underlying relationship between the number of money units and the associated output is actually suffering from inflation” (p. 118). The case of state taxation of a particular set of goods (such as tobacco and alcohol) provides a useful illustration of Rossi’s argument: whereas the purchasing power of a group of consumers will be negatively affected, the purchasing power of the economy as a whole remains unchanged, as the government sector takes over a portion of the national income that is taxed away from aforementioned group of consumers. The critical point of this illustration is that “one has always to distinguish a decline in the purchasing power of money”, which is the appropriate definition of inflation, “from a loss in the purchasing power of those agents who buy the real goods and services whose prices have increased over time”, such as the

²⁴ See, for example, Brayton et al. (2014).

²⁵ See, for example, Bank of England (2015).

consumers of tobacco and alcohol in Rossi's example (*ibid.*, p. 119). This distinction is critical in the theoretical analysis of the causes of inflation, as well as in the elaboration of practical policy designed to manage inflationary pressures or target a specific rate of inflation, a role generally assigned to monetary policy under the NCM policy framework. Although a detailed study of inflation is beyond the scope of this dissertation, and while it is maintained that the consideration of changes in relative prices, if not accurately described as inflation, is nonetheless essential and informative, the value of the above-mentioned perspective is indisputable.

1.14 INFLATION IN GOODS VERSUS ASSET MARKETS AND IMPLICATIONS FOR MONETARY POLICY

The distinction between price rises in the goods markets versus price rises in the market for assets is also crucial and follows from a comprehensive analysis of the relationship between money and assets, on which post-Keynesian literature has been richly informative (Davidson, 1986; Minsky, 1993; Dalziel, 1999-2000). In spite of subdued consumer price inflation during the Great Moderation and in the post-2008 crisis period, there have been notable episodes of significant inflation in property and stock prices, a phenomenon that has been both predicted and explained by the framework outlined in Minsky's financial instability hypothesis. Although the distinction between assets and money is at times illusive in the modern monetary economy, as pointed out by Tobin, and while asset values and wealth are tightly interrelated, as noted by Minsky, changes in the purchasing power of one unit of currency (money in its strictest definition) and one unit of the value of an asset (either capital or financial) frequently follow diverging trajectories. As Minsky (1993, pp. 11-12) insightfully stated, "[i]n the markets where assets, financial and real, are traded, the prices are the present money price of future money flows". It is likewise true that "when asset price inflation is unsustainable, as often turns out to be the case, a financial crisis is triggered when eventually asset values fall sharply" (Dalziel, 1999-2000, p. 228).

These observations undermine a number of fundamental assumptions of the neoclassical monetary paradigm, most notably those of perfect information and rational expectations, as they bring us to the conclusion that temporary deviations from the accurate value of 'the present money price of future money flows' are a recurring characteristic of the modern capitalist economy.

A curious example of the potential instability of asset prices is that of an acquiring company recording on its balance sheet an estimated figure for goodwill following a takeover, often representing an elusive asset (more formally referred to as ‘intangible’) that is expected to bring the company profit in the future, and is equivalent to the excess of purchase price over the fair market value of the target entity’s assets. Such goodwill may represent a pending discovery or innovative idea of the target’s research and development (R&D) department, or it may represent new synergies that the merger of the target and the acquirer are expected to create, ultimately resulting in increased profitability. The recording of goodwill increases the book value of the resulting entity and, unless analysts as a group choose to exclude this goodwill from the calculation of the company’s assets, the increased company value may be reflected in the stock price of the merged entity. As the stock price of the new entity increases, individual stockholders perceive their wealth to have risen by the corresponding amount. However, such an increase in wealth may turn out to be temporary if with time the expected profit related to the recorded goodwill is not realized and the company writes down a portion, or all, of the goodwill in a process referred to as impairment, causing a reversal of the initial increase in stock prices and a loss of the additional ‘wealth’ that stockholders had initially perceived to have obtained. Of course, such a process of corporate wealth fluctuations may occur completely independently of the changes in the general price level in the goods market, which, as discussed earlier, is most likely related to wage and cost pressures that affect the production of real goods and services undertaken by entrepreneurs based on their estimate of future effective demand.

This subject, which will re-emerge in the analysis of subsequent chapters, is critical to the understanding of existing monetary policy transmission channels. Since the central bank can exert direct pressure on asset prices (via targeted purchases of private and public assets in the market) with the aim of influencing economic activity, it is instrumental to further our understanding of the link between the behaviour of prices in the financial and goods markets, so as to draw appropriate conclusions on the effectiveness of monetary policy. It is not evident, from a theoretical examination of the causes of inflation in the market for goods and services undertaken so far, how monetary policy, for which inflation management is central under the current paradigm, can succeed in this goal. Furthermore, a post-Keynesian analysis of the relationship between monetary policy and inflation rates challenges neoclassical assumptions on a number of fronts, as will be discussed in the subsequent chapter. For example, the mainstream view, represented by the Phillips curve, that ‘restrictive’ monetary policy (to wit, a higher policy rate of interest) necessarily lowers aggregate demand, thus

dampening inflationary pressures (as well as the contrary scenario) is complicated by the introduction of an ‘interest rate channel’ of monetary policy, whereby interest payments on investment assets are seen as a crucial form of income. In such a scenario, the increase of aggregate interest payments via ‘restrictive’ monetary policy (a higher policy rate of interest) has stimulative effects on aggregate demand and thus possibly exerts upward pressure on the price level in this paradigm, while the lowering of the policy rate of interest, rather than stimulating economic activity, may have quite the contrary effect (Argitis, 2011, p. 97; see also discussion in Borio & Zhu, 2008).

Clearly, the elaboration of a perspective on the nature of ‘money’, the manner in which it enters the economy (through expansionary monetary policy or increased lending of the banking and corporate sector), its role in determining prices in the goods and asset markets, its relationship with the rate of unemployment and the productive possibility of the corporate sector, is a fundamental and indisputable first step in the analysis of the effectiveness of monetary policy, and is summarized to a significant degree by the ‘endogenous versus exogenous’ debate in monetary theory, as presented in this chapter. The conclusions of the discussion on the theory of money undertaken thus far favour the adoption of the endogenous money perspective, represented most notably by the post-Keynesian school of thought, and underscore the need for the elaboration of a comprehensive theory of central banking, the goal of Chapter 2, on the basis of which can be analysed, theoretically and empirically, the transmission channels of monetary policy. In the elaboration of an appropriate theory of central banking in the subsequent chapter, it is critical to recall the central conclusions of the prior evaluation of the fundamental concepts in the theory of money and their evolution through recent intellectual history.

The analysis of the subsequent chapter is thus founded on the endogenous money view, which emphasizes the inability of the central bank to control monetary aggregates and which highlights the importance of (demand-driven) bank lending as the determining factor in the expansion and contraction of the money supply. Although this perspective negates money neutrality and superneutrality, the assumption of money endogeneity does not necessarily lead us to the conclusion that monetary policy is effective in its efforts to stimulate long-run economic growth, as in its essence money endogeneity underscores the limits of monetary policy, rather than illuminating its potency.

Crucially, a limited availability of credit can constrain production, dampening economic growth, but the decision on the part of the banking sector to lend does not depend on the availability of reserves provided by the central bank, which in actual fact the central

bank provides continuously on demand. The concept of the money multiplier, frequently used to support the argument for monetary policy effectiveness in stimulating economic activity, is thus fundamentally flawed, and it is not through the provision of additional reserves that the central bank can hope to stimulate economic growth. An analysis of the endogenous nature of credit money has brought to light the circular nature of the interaction between credit provision and the expansion of output, whereby expanding credit permits greater investment and output growth, while the process of economic growth necessitates the (demand-driven) granting of credit to finance entrepreneurial activity.

However, policies designed to increase the quantity of aggregate savings, with the purpose of stimulating lending and thus stimulating economic activity, are futile, as the granting of loans does not depend on the quantity of deposits (which are associated in an erroneous relationship with pre-existing savings in the neoclassical perspective) on a bank's balance sheet. Rather, a loan is granted and a deposit is created simultaneously in an accounting transaction that results from a profit-centred decision by a bank to increase marginal lending. Building on this theoretical foundation, a closer examination of the mechanisms of monetary policy is possible. The role of the central bank, the importance of the financial sector and the existence of financial frictions are but some of the themes of the subsequent chapter, the central aim of which is to bring us one step closer to forming a comprehensive framework for the evaluation of the potential for monetary policy to stimulate economic growth.

2 ENDOGENOUS MONEY AND THE THEORY OF CENTRAL BANKING

A sound theoretical framework, logical in its assumptions and coherent in its heuristics, is the essential starting point of empirical research in the field of monetary economics, as in all sciences, if the results of such research are to contribute effectively to the elaboration of a central bank's policy paradigm, chosen and implemented by a central bank in its aim to successfully achieve economic and social objectives within its statutory mandate. The discussion in Chapter 1 has offered a comprehensive critique of a number of fundamental ideas that form the neoclassical framework, particularly of the view on the nature and the role of money in the modern economy that this mainstream framework employs, turning instead to post-Keynesian literature in expounding an alternative perspective deemed more appropriate to understanding and analysing modern money and its role in the monetary economy of the United States.

Implications of the post-Keynesian analysis of money on the elaboration of an accurate and insightful theory of central banking are numerous and stand in stark juxtaposition to mainstream neoclassical theory, and more specifically, to the NCM framework currently used by the Fed in policy design and implementation. In the post-Keynesian framework, money endogeneity is seen as an essential characteristic of the monetary production economy rather than a consequence of central bank policy, as assumed in mainstream theory, and money's non-neutrality is a logical consequence of its endogeneity (see section 1.1). The role of cost-push inflation, emphasized in post-Keynesian literature in contrast to the demand-pull view of inflation supported by the mainstream paradigm, raises significant questions with regards to the appropriateness and effectiveness of the implicit inflation-targeting regime in use by the Fed (see section 1.13), and the post-Keynesian insight on the relationship between money and asset prices suggests critical contraindications to the use of expansionary monetary policy at times of inflating asset prices (see section 1.14).

The above considerations, as well as other ideas of the heterodox persuasion introduced in Chapter 1, will be fundamental to the ensuing analysis of the theory of central banking. The goal of this chapter is to present a critical evaluation of the theoretical role of the central bank on a number of fronts. In particular, the evolution of Fed policy will be presented briefly in a historical context; the central bank's unique and imperative mandate will be considered in theory and practice; short- and longer-term policy implementation will be discussed in the context of monetary policy objectives, with a consideration of targets,

tools, strategy and mechanisms of policy execution; and a critical evaluation of the current monetary policy paradigm of the Federal Reserve will be offered in the context of alternative, particularly post-Keynesian, theories of central banking. The ultimate purpose of the proposed deliberation is to prepare the groundwork for an evaluation of the transmission channels of monetary policy, undertaken in Chapters 3 and 4, with the aim of understanding the theoretical and practical potential of central bank policy to influence economic growth, especially during economic downturns and at times of financial strain.

2.1 HISTORICAL EVOLUTION OF THE THEORETICAL PARADIGM OF US CENTRAL BANKING

The theoretical paradigm governing US monetary policy and its practical implementation has gone through a number of critical stages of evolution in the recent half-century. The major historical milestones of this evolution are worth mentioning, as they provide an informative, albeit partial, illustration of the trial-and-error learning process that has led to the *status quo* of monetary policy practice of the Federal Reserve. The post-WWI years, and the dire economic conditions which characterized this period, were particularly critical in setting in motion currents of change that would drastically alter the nature of central banking in the United States.

The Great Depression of the 1920s and 1930s and the post-war preoccupation with unemployment and social unrest led to the signing into law of the Employment Act of 1946, which created a commitment on behalf of the federal government, including the Federal Reserve, to assure “conditions under which there will be afforded useful employment opportunities, including self-employment, for those able, willing, and seeking work, and to promote maximum employment, production, and purchasing power” (original Act text quoted in Scitovszky, 1946). Since 1942, the Fed was under the obligation to maintain low interest rates, a policy which during the war years was viewed as necessary to permit the Treasury to fund military spending, and which was maintained in the post-war years as a show of commitment by the federal government to preserve the price of the large stock of WWII debt held by the public. These objectives and practices, supported by the popularity of Keynesian stabilization policies that involved significant government spending, supported by a quiescent Federal Reserve, created inflationary pressures that were initially welcomed by a policy framework governed by a belief in the existence of a Phillips curve, according to which inflation, seen as a mere ‘inconvenience’, was viewed as a small price to pay for presumed gains in employment. Eventually, however, inflation reached politically unacceptable levels,

fuelled by consumer goods shortages and soaring commodity prices at the time of the Korean War of the late 1940s, causing increasing tensions between the Fed and the Treasury, which culminated in the signing of the Treasury-Fed Accord on March 4, 1951. The Accord released the Federal Reserve from its obligation to maintain low interest rates for the government and set the stage for the implementation of independent monetary policy (see Hetzel & Leach, 2001, p. 40; Bryan, 2013), so fundamental to the practice of central banking today.

While there is little disagreement on the causes of the inflation that characterized the post-WWII era and the Korean War years, or on the implications and importance of the modifications to the monetary policy approach that resulted from the signing of the Treasury-Fed accord, the Great Inflation of the 1970s presents a case of greater controversy worthy of examination. The policy framework that governed monetary and fiscal decision making in the 1960s and 1970s was drastically different from that of the 1950s, a period characterized by subdued inflation, a policy of fiscal restraint and relatively strong economic performance.

These economically blissful years came to an end when inflationary pressures began to increase in the late 1960s, eliciting a response from the fiscal and monetary authorities that, according to the neoclassical view, was the cause of the prolonged period of excessive inflation, the Great Inflation, which lasted until the mid-1980s. According to Cristina Romer, an influential proponent of neoclassical economic theory, the Great Inflation can be explained by a number of systematic policy mistakes of the Fed and the Treasury. In particular, Romer argues that an overestimation of the ‘natural’ rate of unemployment and the view that monetary policy would be powerless to contain inflation largely caused by wage-cost pressures led the monetary authorities to adopt overly lax monetary policy that contributed to the rising inflation. When, on a number of occasions, inflation was indeed deemed “too high” and the Fed responded by raising the federal funds rate, “tightening was indeed carried far enough to generate a recession, but not far enough to actually cure inflation” (Romer, 2007, p. 14). This period of monetary history is critical as the latter view, championed by Romer amongst many other neoclassical economists, would provide the foundations for a drastic change in policy under Fed Chairman Paul Volcker in the 1980s, influencing monetary policy making to this day.

Turning to post-Keynesian theory for an alternative explanation of the macroeconomic events of the 1960s and 1970s, it is of little surprise that the Fed’s untimely interest rate increases, intended to rein in inflation during this period, led to recession while

failing to make any significant impact on the rate of change in the price level.²⁶ Indeed, as argued in Chapter 1, monetary policy in the endogenous money framework is powerless to contain inflation caused by wage-cost pressures and, in the case of the period under examination, by several important oil and energy price shocks resulting from unrest in the Middle East. In fact, the Federal Open Market Committee (FOMC) Memoranda of Discussion of June 8, 1971 illustrates the reserve with which the FOMC ultimately decided to raise interest rates given the already-fragile state of the economy two years before the oil crisis; the decision to increase the fed funds rate rested on an unfounded concern with an accelerated growth rate in monetary aggregates (Federal Open Market Committee, 1971, pp. 57-58), which at the time the Fed erroneously believed could be influenced by monetary policy.

Founded on the classical quantity theory of money framework (see section 1.1), the view that “[t]he origins of the Great Inflation were policies that allowed for an excessive growth in the supply of money – Federal Reserve policies” (Bryan, 2013, Internet), would provide the impetus for a drastic change in policy that characterized the Volcker-Greenspan-Bernanke Fed policy approach, and which would gradually evolve into the NCM framework that now dominates mainstream monetary policy thinking. Likewise, the economic turbulence of the 1960s and 1970s led to a critical legislative initiative that contributed to the moulding of the Federal Reserve’s policy mandate. The Federal Reserve Reform Act of 1977 made explicit the responsibility of the Board of Governors of the Federal Reserve and members of the FOMC to “maintain long run growth of the monetary and credit aggregates commensurate with the economy’s long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates” (US Congress, 1977). While the Fed would eventually relinquish on its efforts to target monetary aggregates, as prescribed by the Act of 1977, the responsibility to promote maximum employment and stable prices form the basis of the Fed’s modern mandate, while reference to its duty to promote ‘moderate long-term interest rates’ has been largely erased from policy rhetoric.

Under the leadership of Chairman Volcker, the Fed would briefly deviate from previous policy of targeting monetary aggregates via changes in the fed funds rate to

²⁶ Evidence that inappropriately-high policy rates of interest may lead to a policy-induced recession is presented in section 2.2.3.

experiment with the targeting of reserve growth,²⁷ in an attempt to more effectively control the growth rate of money in the economy, as part of Volcker's aggressive fight against inflation. This policy, introduced in October 1979, led to significant volatility of the fed funds rate and was abandoned in 1982. The mainstream view maintains that this policy failed because of significant financial and regulatory innovation that profoundly changed the mechanisms of monetary policy and the ability of the central bank to control monetary aggregates via the targeting of reserves.²⁸ It has also been (rather creatively) argued that it was never actually the intent of the Fed to target monetary aggregates, but that it was instead "a smokescreen to obscure the need of the Fed to raise interest rates to very high levels to reduce inflation" (Mishkin, 2001, p. 2).

In reality, as will be illustrated in greater detail throughout this chapter, the endogenous nature of money creation had deemed this policy to fail at inception, a fact that would have held just as readily in the decades prior to the deregulation and financial innovation of the 1970s. In addition to the failure of the aforementioned policy, persistently high interest rates, the attempts to manage reserves and the introduction of credit controls eventually led to recession and, helped by the fall in the price of oil, inflation abated. Despite the failure of the policy of targeting monetary aggregates, it was not until July 2000 that the Federal Reserve officially announced that it would no longer set target ranges for the money supply, following a speech by Fed Chairman Alan Greenspan in which he stated that "[t]he historical relationships between money and income, and between money and the price level have largely broken down, depriving the aggregates of much of their usefulness as guides to policy" (Federal Reserve Bank of New York, 2008, Internet), an explanation similar to that offered by the Volcker Fed for the failure of policy in the late 1970s-early 1980s.

2.2 THE ROLE OF THE CENTRAL BANK IN THE MODERN ECONOMY: THEORY VERSUS PRACTICE

The historical experience of the Fed has thus moulded the theoretical and practical approach of monetary policy decision making in the United States, leading to the elaboration of the NCM paradigm, introduced in section 1.8 and subject of a detailed discussion in section 2.4. Before delving into the details of the NCM model, however, it is necessary to consider the theoretical and practical role of the central bank in the modern economy and to reemphasize the view that the current monetary policy paradigm gives disproportionate responsibility to

²⁷ Bindseil (2004) suggests that the Fed's policy during this short time window was a truly unique attempt by a central bank to manage reserve quantities in a serious manner (p. 7).

²⁸ See, for example, Federal Reserve Bank of San Francisco (2003).

the monetary authorities, based on an excessive (and generally misguided) presumption of central bank ‘power’ to control inflation and to mechanically manage the current rate of economic growth. By elaborating a concrete view on what, in theory, is the responsibility of the central bank in the implementation of monetary policy and by considering the challenges and obstacles it faces in practice, we set the stage for a technical discussion of the central bank model currently used by the Federal Reserve in subsequent sections, as well as for an effective analysis of the transmission channels of monetary policy undertaken in Chapters 3 and 4.

2.2.1 EVALUATING THE FED’S STATED POLICY MANDATE

The starting point of a critical evaluation of the Federal Reserve’s policy objectives inevitably contains an element of subjectivity, as first and foremost it is necessary to define what *should* be, within the framework of the analysis at hand, the ultimate goal of central bank policy making. The stated statutory mandate of the Federal Reserve is tripartite, as discussed previously, involving the promotion of maximum employment, stable prices and moderate long-term interest rates (Board of Governors, 2012), although in practice only the first two are given priority, with frequent reference to the Fed’s ‘dual mandate’ in academic and policy discussion.

Considering the last of these objectives, we can argue that a ‘moderate’ level of long-term interest rates is ultimately not a final objective, but rather an intermediary goal, or an interest rate policy strategy that should be used for maximizing economic growth and employment, and promoting financial stability (Federal Reserve Bank of San Francisco, 2016; see elaboration of this subject in section 5.4). With reference to price stability, as has already been postulated and as will be emphasized further in subsequent discussions, the endogenous money framework supports the view that changes in the general price level are not a direct result of central bank policy (see sections 1.13 and 5.2.3),²⁹ so price stability is not a valid candidate for consideration as the central objective of monetary policy in the post-Keynesian endogenous money framework.

The goal of maximum employment is at first glance both crucial and compatible with post-Keynesian theory; a detailed examination of the underlying justification, however, highlights how its interpretation within the NCM policy framework is critically misguided. Specifically, within the NCM framework, this objective refers to the Fed’s responsibility to

²⁹ See also the discussion in Arestis and Sawyer (2004, pp. 73-75).

respond to temporary deviations of actual unemployment from the long-term natural rate of unemployment, the latter of which is assumed to be entirely unaffected by monetary policy.³⁰ On the contrary, as will be argued throughout this chapter, post-Keynesian theory of endogenously-determined, path dependent rates of economic growth and employment allow for a potentially significant impact of monetary policy on the long-term state of economic activity, if it can be shown that monetary policy is effective in stimulating economic activity (the subject of the analysis in Chapters 3 and 4) or, alternatively, that it has an important role to play in preventing financial crises (the subject of Chapter 5).

Finally, the Fed's mandate does not explicitly mention the promotion of long-term economic growth, as the theoretical model on which current policy is based centres around the concept of a 'natural', or potential, rate of output growth, supply-side determinants of which are beyond the control of monetary policy,³¹ and, in the long term, monetary policy is believed to be entirely neutral. Ironically, following the crisis of 2008, the Fed took on the role of stimulating economic growth via the use of what is frequently (and inappropriately) referred to as 'unconventional' monetary policy (see section 2.4), creating the view that it had a large set of policies at its disposal for the achievement of this objective (Williamson, 2011, p. 68); prolonged lax monetary conditions, frequently claimed to aid in stimulating bank lending and spurring economic growth, merely resulted in a ballooning of reserves with little effect on lending rates and volume, an outcome that was perfectly predictable in the endogenous money framework where lending decisions are, to a large extent, made independently of central bank policy (see section 4.1.3).

2.2.2 AN ALTERNATIVE CENTRAL BANK OBJECTIVE IN A POST-KEYNESIAN FRAMEWORK

An alternative perspective, represented predominantly by the post-Keynesian school of thought, repudiates the concept of a fixed natural or equilibrium rate of output to which the economy inevitably returns following destabilizing economic shocks, postulating instead that the growth rate is demand-determined and path dependent, and that the natural rate of growth is thus endogenously determined by a continuous sequence of short-run outcomes (Lavoie, 2004, p. 25),³² an argument that can be traced back to Keynes's and Kelecki's insightful ideas

³⁰ For a valid consideration of the factors that influence long-term employment trends, see Ewing (1999), Maffeo (2001) and Jenkins et al. (2006).

³¹ See discussion and criticism of this concept in Fontana & Palacio-Vera (2002, p. 562), Lavoie (2004, pp. 24-25), and Gnos & Rochon (2007, p. 377).

³² See section 2.6 for a detailed discussion of this concept.

of the role of effective demand and multiple employment equilibria (see sections 1.3 and 1.4). We allow the latter perspective to frame our analysis of central bank policy objectives, thus arguing that current economic growth (and employment) rates are, or should be, one of the principle concerns of the Federal Reserve's policy making, and that the conduct of monetary policy is thus essential to the determination of long-term growth rates of the economy.³³ Thus, monetary policy is non-neutral both in the short as well as the long term, a conclusion that stands in stark juxtaposition to one of the central tenets of neoclassical monetary theory.

2.2.3 THE ROLE OF THE CENTRAL BANK IN MANAGING FINANCIAL CRISES

The implications of the aforementioned assumption of an endogenous, path-dependent rate of economic growth on the evaluation of a central bank's policy objectives are significant, and inevitably lead us to consider the detrimental effects of financial crises on current and future economic performance. The question of which role the central bank should play in the management of financial crises, which appear to be increasing in frequency and severity (Borio, 2003, p. 1, and Raines et al., 2009, p. 379) was at the centre of the 'lean versus clean' debate that drew substantial attention in policy debates and economic literature during the 1990s, characterized by heated discussion between the 'lean' camp, which argued for monetary policy aimed at preventing financial crises by explicitly targeting asset price bubbles, and a 'clean' camp, which represented the view that the central bank's role should be limited to cleaning up in the aftermath of a financial calamity. The mainstream consensus that emerged from this debate and which until the financial crisis of 2008 was the stated view of the Fed (White, 2008, p. 2) favoured the view of the 'clean' camp, based on the belief that it is difficult, if not impossible, to identify asset bubbles, and equally difficult, if not impossible, to devise policy to safely deflate them without inflicting damage on the economy in the process (see discussion in Palley, 2008), and finally, that "monetary policy is far too blunt a tool for effective use against [bubbles in asset markets]" (Bernanke, 2002a, Internet).³⁴

³³ Interestingly, a similar argument has been made by then-President of the European Central Bank Jean-Claude Trichet (in spite of his adhesion to the neoclassical theoretical framework of monetary neutrality and the distinction between real and monetary economic phenomena), who stated that "[d]espite all the ups and downs of recent years, our key challenge remains as it has always been: to create strong, sustainable, balanced, noninflationary growth" (Trichet, 2011, pp. 442-443).

³⁴ Counterarguments to the view against prevention of the build-up of financial imbalances are discussed in Chapter 5. Our final chapter considers the importance of monetary policy and macroprudential regulation in this task, and also discusses a proposal for a more radical approach that allows for the eradication of a structural flaw

The financial crisis of 2008 has challenged the validity of this view, and the severe and prolonged recession that followed led to a drastic revision of perspective amongst both academics and policy makers on the role of pre-emptive policy in managing the accumulation of financial imbalances.³⁵ As a result, there is now growing academic interest in the role of monetary policy in the prevention of financial crises, while evidence on the central bank's ability to impact the rate of economic growth, drawing the economy out of a post-crisis recession, is generally scarce, incomplete and frequently conflicting (this theme is central to the discussion in Chapters 3 and 4). Furthermore, there is increasing awareness that prolonged ultra-low interest rate monetary policy can itself be a contributor to the creation of economic conditions that inevitably end in a financial crisis, as occurred in the decade prior to the collapse of Lehman Brothers and the subsequent economic catastrophe. Understanding the dynamics of the interaction between monetary policy and the financial markets in the upswing of a business cycle at the macroeconomic level is fundamental to the ongoing discussion, as it will permit us to evaluate which central bank policies are effective in the achievement of the (proposed) objective of maximizing an economy's endogenously-determined natural rate of growth, which are inadequate, and which are counterproductive to the extent that they contribute to a destabilizing build-up of financial imbalances.

In particular, while there is minimal controversy in the literature and policy sphere on the view that untimely increases in the policy rate of interest negatively impact the rate of economic growth,³⁶ potentially leading to a policy-induced recession (see Christiano et al., 1994; Bernanke, 2002b; Stiglitz & Greenwald, 2003, p. 149; Arestis & Sawyer, 2004, p. 78; and Palley, 2008, p. 6), insight on how monetary policy may contribute to the creation of financial imbalances generally gained support and attention only in the years following the 2008 crisis. A number of important theoretical channels via which prolonged low-interest rate policy promotes destabilizing alterations in economic activity have been highlighted in recent literature. Borio (2011a), of the Bank for International Settlements, has highlighted the

in the domestic payments system which is responsible for the boom-and-bust leverage cycle of economic activity.

³⁵ The term 'financial imbalances' is used here to refer to the cumulative result of a number of problematic dynamics, including excessive bank risk-taking motivated by nominal required returns on investment (Rajan, 2005), rising leverage resulting, from the perspective of financial market participants, from poor returns on investment and a low cost of leverage, as defined in Adrian & Shin (2009), as well as a number of other dynamics discussed in Altunbas et al., (2009), and in Chapter 4. We develop an alternative, more comprehensive understanding of the underlying causes of the leverage cycle in Chapter 5.

³⁶ In this context, whether the natural rate of growth is viewed as exogenous or endogenous is not fundamental, given the consensus view on the negative impact of inappropriately contractionary policy. However, within the endogenous natural rate of growth view, this impact can be permanent, with the establishment of a new equilibrium at a lower rate of economic growth owing to the effects of path-dependence and hysteresis (Dalziel, 2002, p. 524, and Lavoie, 2004, pp. 28-29).

danger that a prolonged policy of excessively-low interest rates poses by setting an insufficient price on leverage,³⁷ encouraging the build-up of debt and creating dangerous financial imbalances (p. 4), a process accurately described by Minsky's instability hypothesis decades earlier (see section 1.6). Allington and McCombie (2005) describe the self-perpetuating nature of the process that leads to the inflation of asset bubbles by tapping into two competing theoretical frameworks, namely, the efficient market hypothesis and the behavioural finance approach. They present arguments that both rational and irrational elements of investor behaviour contribute to the creation of asset price bubbles in the case of prolonged low interest rates, as investors (rationally) calculate that asset prices will continue to rise, and (irrationally) bid up prices as their expectations are fulfilled in subsequent periods, riding the wave of "irrational exuberance" (p. 71).

Along similar lines, Grant (2015) argues that monetary authorities around the world are employing policy (prolonged and unjustified low interest rates) that has "sponsored flyaway markets in property, stocks and bonds. The object of the sponsorship, near and far, is to boost aggregate demand by raising asset prices. Feeling richer, the asset-holding portion of the community is expected to act the part. Never mind that, by definition, the prices thereby raised are distorted." Correctly, Grant points out that the farther asset prices rise, the greater the distortion of price to value becomes. He leaves no space to doubt that such policy is highly inappropriate: "For an individual to fix Libor is a crime. For a central bank to suppress European bond yields is an act of financial statesmanship." Indeed, such arguments are not new, and do not relate exclusively to the crisis of 2008. Raines et al. (2009) employ an institutional economics perspective in arguing that the Fed, under the leadership of Greenspan and Bernanke, "supported failures of the liquidity function of financial markets in the modern world of financial deregulation and financial derivatives" (p. 368), collaborating with investment banks in promoting credit inflation and subsequent financial failure on a mass scale (pp. 372-376).

A similar institutional economics argument, presented by Stiglitz and Greenwald (2003), gives responsibility to the low interest rate environment of the 1990s for the boom and subsequent recession, fuelled by significant price increases of bonds that at the time made up an important portion of the assets on bank balance sheets, which allowed the banking sector to book unrealized income from these price increases and caused a surge in bank lending (p. 282). Commercial activity is also affected by prolonged expansionary

³⁷ The relationship between the policy rate of interest and the price of leverage is discussed by Adrian & Shin (2009).

monetary policy, as low interest rates “encourage renewed speculation in land purchases, storage activities, and long-lived activities that are sensitive to interest rates” (Palley, 2008, p. 9), creating both vertical (intertemporal) and horizontal (across-sectors) misallocation of financial resources (White, 2012, p. 19).

The above discussion represents just a few of the numerous arguments that have been effectively presented in recent literature on the contribution of prolonged excessively-low interest rate policy to the build-up of financial imbalances that ultimately lead to a financial crisis (see further arguments and relevant sources presented in White, 2012; see Palley, 2008, for international implications of prolonged expansionary policy; see Singh & Stella, 2012, p. 6, on central bank liquidity, the money markets and the expansion of credit; and see Borio & Zhu, 2008, for an elaboration of the distortionary effects on the evaluation of risk and the importance of the risk-taking channel of monetary policy). The above-mentioned considerations of pre-crisis financial and economic developments in a low-interest rate environment are equally fundamental to the evaluation of the role of monetary policy in the post-crisis period, given the hitherto-presented evidence that, at least to some extent, a prolonged period of low interest rates sets the stage for the occurrence of a subsequent financial crisis, a phenomenon that has been termed the “issue of serial bubbles” (White, 2012, p. 25).

Specifically, there is evidence that near-zero interest rate policy and large-scale balance sheet policy employed by the central bank, aimed at speeding up economic recovery, actually slow down this much-needed process in the years following a financial crisis, hindering balance sheet repair and masking underlying solvency problems (Hannoun, 2012, p. 7), distorting normal financial market functioning (leading to an ‘atrophy’ of markets) and muting price discovery (divorcing financial asset prices from fundamentals) (*ibid.*, p. 8), squeezing yields on earning assets of institutions dependent on fixed income profits (such as pension funds and insurance companies) (Borio, 2011a, pp. 5-6), reducing the pace of asset accumulation and increasing the present value of future liabilities, thus augmenting the household savings rate rather than boosting spending and aggregate demand (White, 2012, p. 12), and increasing uncertainty, further depressing spending and investment (*ibid.*, p. 11).

The conflicting demands, both explicit and implicit, readily taken on board by the US monetary authorities in the years since the collapse of Lehman Brothers (prevent a financial calamity, stimulate bank lending, allow for an orderly economic deleveraging, promote a swift return to pre-crisis levels of economic growth) have thus pushed the theoretical and empirical work in the field of monetary policy to the frontier, with no evident consensus on

which monetary policy strategy is appropriate in the aftermath of a financial crisis, but with general agreement that large-scale balance sheet intervention, ample liquidity and near-zero interest rates have failed to bring about swift economic recovery and have contributed to the accumulation of further financial imbalances that present a significant threat to the health of the US economy at present day.³⁸

2.3 THE MECHANISMS OF MONETARY POLICY: DAILY LIQUIDITY MANAGEMENT VS. LONG-TERM OBJECTIVES

“Overall, the 20th century thus seems to have witnessed in the domain of monetary policy implementation a strange symbiosis between academic economists stuck in reality-detached concepts, and central bankers who were open to such concepts...”
(Bindseil, 2004, pp. 5-6).

The theoretical evaluation of the objectives of monetary policy as well as the analysis of the role of monetary policy in the management of financial crises has brought us one step closer to our ultimate aim of understanding the mechanisms of monetary policy transmission at times of depressed economic activity. Our theoretical analysis is incomplete, however, without a clear understanding of how monetary policy is executed on a daily basis via adjustment of its operational target (the interest rate) and an evaluation of the tools the central bank has at its disposal³⁹ for the achievement of its objectives via the elaboration of a comprehensive monetary policy strategy (that is, how it chooses to use its tools to adjust the operational target with a view to balancing its priorities in the achievement of, at times, conflicting policy objectives).⁴⁰

As argued previously (see sections 1.2 and 1.10), the central bank has no direct control over monetary aggregates, and its exclusive operational target in the execution of daily monetary policy is the interest rate, the federal funds rate in the case of the Federal Reserve, at which US depository institutions can lend and borrow overnight reserves from each other via Federal Reserve banks. While, regrettably, a minority of mainstream

³⁸ The analysis undertaken in Chapters 3 and 4 aims to fill this gap in research by examining in detail all transmission channels of monetary policy that, to the best of our knowledge, have been considered in prior literature, including three ‘negative’ transmission channels (the income channel and two alternative risk-taking channels), and by illustrating how low interest rate policy and the so-called ‘quantitative easing’ programmes are contributing to the build-up of financial imbalances, thus augmenting the risk of a repeat financial crisis occurring in the near future. Chapter 5 considers the negative role of low interest rate policy in economic growth dynamics, subsequently proposing a potential positive role of the central bank operating in an alternative framework of monetary policy.

³⁹ See Bindseil (2004, p. 9) for a discussion of the tools available to the Fed, namely, standing facilities, open market operations and reserve requirements.

⁴⁰ For the stated monetary policy strategy of the Federal Reserve, see http://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals.pdf.

economists still views the control of base money as a prerogative of the central bank (see, for example, Howitt, 2012, p. 18 and Bartlett 2015, Internet, for an example of this view, and also the work of Bindseil, 2004, for an insightful elaboration on the disconnect between the practice of monetary policy implementation and the “fallacious doctrine” of the central bank operating framework based on monetary aggregates as intermediate targets in mainstream academic literature), the majority of mainstream (New Keynesian) models used in policy formation and empirical work incorporate money as an endogenous variable, focusing on the effects of interest rate changes on economic activity and the financial markets.⁴¹

In fact, contrary to textbook orthodoxy, the mechanism through which the central bank affects the interest rate does not directly involve open market operations (OMOs), which are actually used to manage reserves for the purpose of preventing interest rate volatility (Disyatat, 2008, p. 6), alongside the use of a number of different standing facilities.⁴² The desired level of the policy rate of interest, which can coexist with a variety of levels of bank reserves and various configurations of yield curves (Borio & Disyatat, 2009, p. 3) is set via one of three possible approaches (or a combination of them), namely, the channel system, which involves maintaining the overnight lending rate of interest within a pre-defined corridor determined by the interest rates set on the standing facilities, the remuneration of reserves (at or below the policy rate of interest), or the use of the central bank overnight lending rate as the policy rate, whereby overnight loans are extended at a pre-defined policy rate on demand) (see Whitesell, 2006; Borio & Disyatat, 2009; and Williamson, 2011, for a discussion of these methods of interest rate management).

On October 1, 2008, the Fed began to pay interest on both required and excess reserve balances as an additional measure aimed at increasing the range of tools available to the central bank in its effort to stabilize turbulent financial conditions in the post-crisis period (US Congress, 2006), during which the effective federal funds rate was at times below the target range set by the Fed. By paying interest on excess reserve balances at the target rate, the Fed is able to equate the opportunity cost of holding reserves to zero, eliminating the incentive for interbank lending to occur below this rate, thus rendering the policy rate of interest independent from the quantity of reserves in the system above a certain threshold. Hence, even under abnormal market conditions, the Fed manages interest rates not via control of the quantity of central bank money but via the setting of the terms on which reserves are

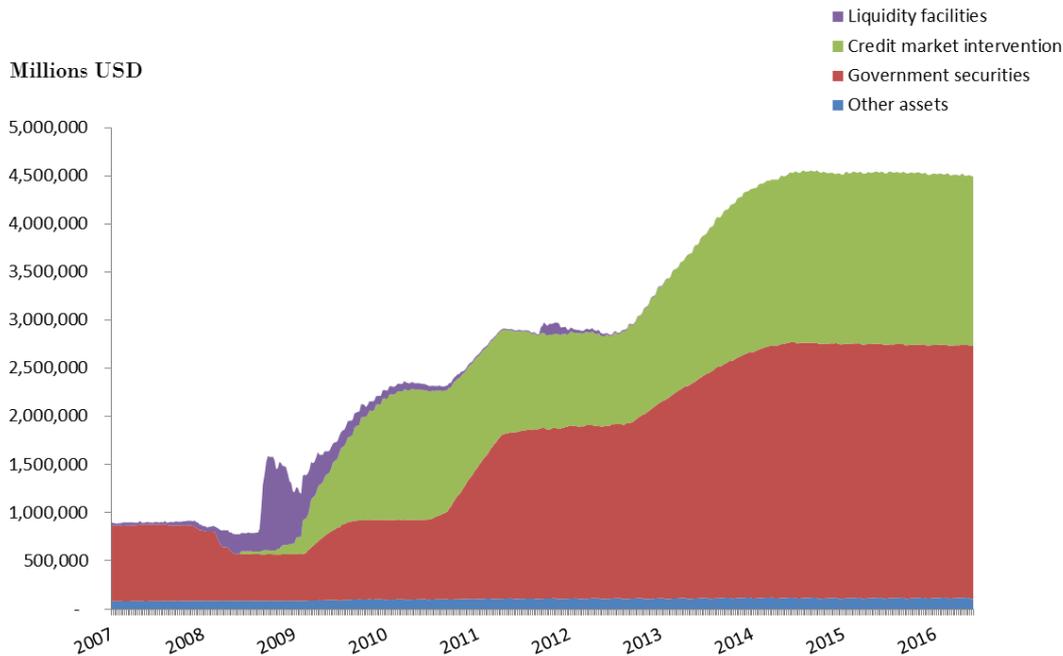
⁴¹ See section 2.5.1 for a discussion of the distinct nature of money endogeneity in neoclassical versus post-Keynesian models.

⁴² For a description of the various standing facilities used to provide funds to depository institutions and primary dealers, see Federal Bank of New York (2009), “Forms of Federal Reserve lending”.

provided (Disyatat, 2008, p. 2). Furthermore, given the efficacy and commitment with which the Fed has managed the setting of the operating target in recent years, as well as the transparency of monetary policy, an ‘anticipation effect’ has been noted and validated empirically by Carpenter and Demiralp (2006), whereby the fed funds rate moves towards the target rate of interest even before the policy announcement is made by the central bank.

US central bank balances, or bank reserves, are comprised of required and excess reserves, in theory remunerated independently, though in practice, since the introduction of the interest on reserves, rates on the two have been identical. While under normal circumstances the quantity of excess reserves held by banks (for the purpose of liquidity management) on their account at the central bank are minimal,⁴³ recent experience shows that at times of financial strain excess reserve levels can rise significantly as a result of banks’ and the private sector’s willing participation in central bank-initiated liquidity programmes. Exhibit 1 provides a graphical illustration of the evolution of the Federal Reserve’s balance sheet, including reserves and assets growth, since the crisis.

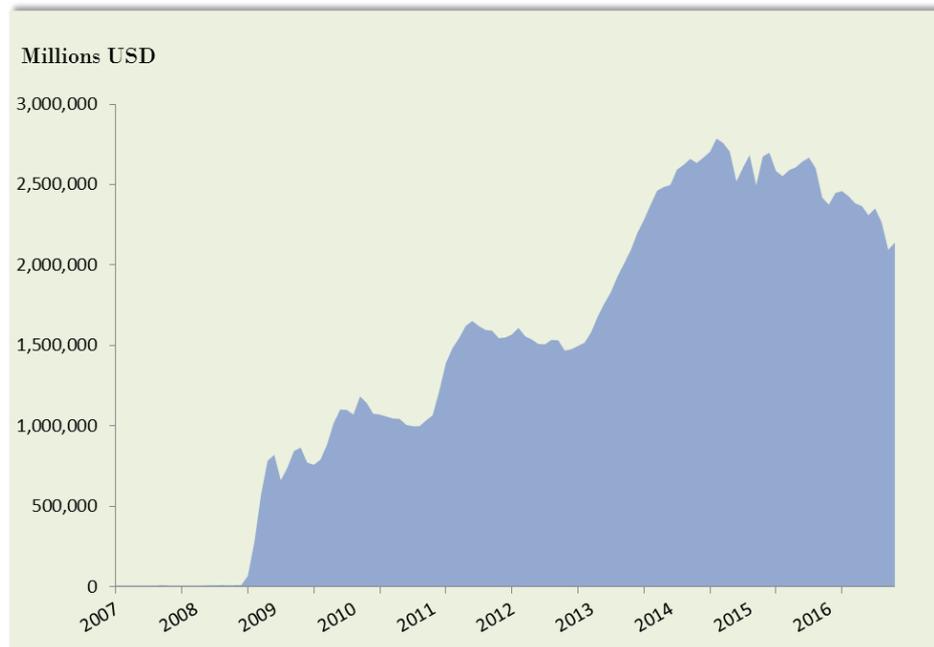
Exhibit 1 Federal Reserve balance sheet assets by category, 2007-2016



Source: Author’s elaboration on Federal Reserve Board data, H.3 Statistical Release.

⁴³ Excess reserves typically present a cost to the bank as they are either not remunerated or remunerated below the market rate of interest, as was the case in the United States prior to the crisis measures of 2008 (Disyatat, 2008, p. 4).

Exhibit 2 Total reserve balances of the US banking system, 2006-2016



Source: Author's elaboration on Federal Reserve Board data, H.3 Statistical Release.

It is crucial to note that, while reserve balances play a fundamental role in the functioning of the banking system, as reserves are the means of final settlement of payments amongst banks (Rochon & Rossi, 2004, p. 152) and the source of liquidity for deposit redemption by a bank's customers, the quantity of reserves held is not directly determined by a central bank's target interest rate, such that central bank balances are highly interest inelastic, and consequently "a given amount of balances can be consistent with a large range of interest rates" (Disyatat, 2008, p. 4), a concept that has also been coined as the "decoupling principle" by Borio and Disyatat (2009, p. 1). As mentioned above, OMOs are used to ensure that there is sufficient supply of reserves (preventing liquidity shortages and consequent spikes in the borrowing rate of interest) and to eliminate excess reserves in the case where these are not remunerated (eliminating possible downward pressure on the interest rate in the case of excess liquidity in the interbank market), thus minimizing volatility of the interest rate.

The configuration of the relationship and the interaction between the central bank and the participating banks in the endogenous process of money creation and the flow of money within the monetary system is thoroughly presented by Rossi (2007), who underscores the limits to the central bank's and participating banks' ability to create money, which is ultimately the result of "a demand for a means of final payment from either non-bank agents

[...] or the banking system” (p. 121), a demand that eventually corresponds to the production of goods and services within the domestic economy.

This limit on the creation of money does not, however, undermine the importance of the central bank, which, on the contrary, plays a critical role in this interpretation of its theoretical responsibility. In addition to its fundamental role as lender of last resort, which is beyond the scope of the current discussion (see Bindseil and Laeven, 2017 for an insightful discussion), Rochon and Rossi (2004) underscore the importance of the central bank’s twofold daily responsibility, which can be separated into an accommodative (dynamic) and a defensive (static) function. Specifically, the authors argue that the central bank’s failure to effectively carry out its accommodative (or dynamic) role, which refers to the appropriate provision of the requested quantity of reserves to the banking sector, “may result in jeopardizing the liquidity of this system”, while its ability to preserve the necessary level of bank reserves depends on the effectiveness of its defensive transactions designed to offset monetary flows that result from daily financial flows within the interbank system (p. 147).

Beyond this important role of daily reserve management (to which we also refer as short-term interest rate policy), recent financial turmoil and the drawn-out recession that followed have led to unprecedented emphasis on central bank policy in the management of economic fallout from the financial crisis of 2008. Related policies, popularly termed ‘unconventional’ in policy discussions and academic circles, while not necessarily unconventional in nature, have certainly been unconventional in scale and combination, as well as in their implicit purpose of stimulating an unresponsive economy. Borio and Disyatat (2009) propose an alternative categorization of the policies of the Federal Reserve to the mainstream ‘conventional’/‘unconventional’ dichotomy, an alternative judged most reflective of reality and applicable to the theoretical framework employed in this dissertation, as well as most appropriate to the evaluation of the effectiveness (or ineffectiveness) of each policy available to the Fed.

What follows is a presentation of two broad categories of policies that supplement the Fed’s standard short-term interest rate policy, namely *balance sheet policy* and *forward guidance*, with the first sub-divided into two further categories referred to as *quasi-debt management policy* and *credit policy*, drawn from the Borio and Disyatat (2009) classification. A brief description and evaluation of the possible transmission channels of each category of policy within the proposed framework founded on endogenous money, loan-determined deposit creation and bank-driven reserve fluctuations is the final step in creating the foundations for a detailed critique of the mainstream NCM paradigm driving central bank

decision making and the sketching of an alternative perspective on the theory of central banking in the subsequent sections.

2.4 BEYOND INTEREST RATE MANAGEMENT: DEBT, CREDIT AND EXPECTATIONS POLICY

An examination of the individual policies employed by the Federal Reserve since the crisis⁴⁴ illustrates the insufficiency of the conventional/unconventional dichotomy, pointed out by Borio and Disyatat (2009), in defining and describing the post-crisis monetary policy measures employed by the Federal Reserve in the period since the collapse of Lehman Brothers. We first turn our attention to quasi-debt management policy, one of two policies that involve a change in the composition and/or the size of the Fed's balance sheet (that is, balance sheet policy), which is implemented via the purchase of government debt for the purpose of managing interest rates at the long end of the maturity spectrum, theoretically altering the cost of funding and impacting asset prices. Since the introduction of remuneration of required and excess reserves in 2008, balance sheet policy has been independent of the setting of the policy rate of interest even in the absence of sterilization (the use of reverse transactions to neutralize the effects of the initial policy on reserve balances that is necessary where required reserves are not remunerated) (see section 2.3; Keister & McAndrews, 2009; McTeer, 2012).⁴⁵

While standard permanent OMOs⁴⁶ similarly involve the purchase or sale of government securities, such operations are generally focused on the short end of the maturity spectrum and are used to manage reserve balances on a daily basis, so as to prevent fluctuations in the policy rate of interest. Quasi-debt management policy implemented in the post-crisis period, under the name "Purchase of long-term Treasury securities & maturity extension program", is theoretically different from standard permanent OMOs in that it involves the longer end of the maturity spectrum, since by design this policy is meant to go beyond the daily management of reserve balances to impact longer-term interest rates via a number of channels discussed and analysed in section 3.1.1. In practice, however, OMOs undertaken in the pre-crisis period at times involved the purchase of bonds with maturities over 25 years (Federal Reserve Bank of New York, 2015). This addition to, or rather

⁴⁴ See Table 1 in the Appendix for a detailed presentation of existing monetary policy facilities.

⁴⁵ A misrepresentation of the mechanism of this policy is not uncommon even in high-level policy discussions. See, for example, Lacker (2009, p. 3).

⁴⁶ Purchases of securities on an outright basis are referred to as 'permanent' OMOs, as opposed to 'temporary' OMOs referred to as 'repo' transactions, whereby the operation is reversed after a pre-defined time period.

extension of, the Federal Reserve's standard set of policies is thus neither unconventional nor unorthodox, differing predominantly in two respects, namely its intended purpose of impacting longer-term interest rates⁴⁷ (and as a result asset prices and credit availability in the private sector) (Bernanke et al., 2004), and its impact on the central bank's balance sheet size and composition in the longer term.

The second element of balance sheet policy, termed 'credit policy' in the Borio and Disyatat (2009) classification, involves the direct intervention of the central bank in the private debt and securities markets with the aim of influencing credit conditions of the private sector, and may or may not involve the expansion of the central bank's balance sheet. Generally, such operations involve central bank actions such as the broadening of the eligible collateral or the eligible counterparty list for standard and crisis-period central bank operation, the purchase of or price support for private sector securities, and the undertaking of exceptionally long-term operations in the private credit markets.⁴⁸

Beyond the goal of market stabilization at the peak of a financial panic, such policies are designed to ease term premia thus lowering long-term interest rates, boost asset prices, generally stimulate activity in the wholesale market for borrowed funds, and support key markets such as the mortgage market and the market for consumer credit, seen as fundamental conduits of liquidity necessary for the achievement of maximum economic growth in the longer term.⁴⁹ Again, the broader balance sheet channel and the signalling channel are the traditional channels presumed to play a key role in delivering the intended stimulus to the economy, with the risk-taking channel (Borio & Zhu, 2008) being a more recent candidate for consideration in the transmission of credit policy and its effectiveness (as well as appropriateness) in stimulating economic activity. As in the case of quasi-debt management policy, credit policy undertaken by the Fed in the post-crisis period has been by all counts an extension of existent monetary policy tools,⁵⁰ differing only in scale, impact on the size and composition of the central bank balance sheet and, in some cases, on the degree

⁴⁷ Longer-term interest rates in this context are correctly defined as an intermediate, rather than an operational, target (see Bindseil, 2004, p. 9).

⁴⁸ Specific programmes that fall under this balance sheet category, such as TAF, PDCF, TSLF, CPFF, are listed and described in Table 1. Note that repo transactions undertaken with the purpose of providing liquidity under these crisis-time programmes (rather than as standard temporary OMOs executed for reserve management purposes) are defined as credit policy.

⁴⁹ Whether, and via which channels, these policy goals are actually achieved is the subject of Chapters 3 and 4.

⁵⁰ Arguably, though, use of such tools is based on the questionable assumption that the central bank is able to control the long-term interest rate, generally viewed as an 'intermediate target' (see Bindseil, 2004, p. 9 for this definition and section 3.1.1 for an evaluation of the empirical evidence on the success of central bank policies aimed at managing long-term interest rates).

of penetration of certain credit markets, involving the purchase of assets further down the rating scale than pre-crisis measures generally targeted.

The final category of policy, not explicitly defined in the Borio and Disyatat (2009) framework but useful to consider in its own right given the increasing attention it is receiving in policy circles of late, is forward guidance, a policy of expectations management. The term ‘forward guidance’ refers to a central bank’s public announcement about the likely future path of its short-term interest rate, and is employed with the intention of affecting long-term market rates by influencing the expected spot rates at given maturities along the yield curve. In December 2012, the Fed moved from qualitative to quantitative forward guidance, beginning to indicate quantitative targets for the federal funds rate based on a specific level of economic indicators, a policy founded on the view that transparency improves efficiency of central bank policy and on the theory of optimal monetary policy inertia, which states that small but persistent alterations in the short-term interest rate, rather than less predictable, more drastic adjustments of this rate, permit the monetary authorities to exert a greater influence on long-term rates of interest and overall aggregate demand (Woodford, 1999).

In the context of post-crisis policy initiatives, the theoretical transmission channel of forward guidance is characterized by a stimulative effect on aggregate demand based on the perception of improved future economic prospects supported by accommodative monetary policy and increased investment in view of the perceived persistence of low interest rates in future. As such, it is an extension of traditional interest rate policy, which reaches the limit of its effectiveness at the zero lower bound.

2.5 CONJECTURAL IDEALISM OR FUNDAMENTAL MISREPRESENTATION? CRITICISM OF THE NCM THEORETICAL FRAMEWORK

“The lonely nerd who is perfectly informed about the relevant frequency distributions over an infinite time horizon and who understands and strictly observes his intertemporal budget constraint is a poor starting point if one is out to understand a world of burst bubbles, failed Ponzi games and mass defaults as typically produced by a financial crisis” (Landmann, 2014, p. 14).

2.5.1 A SYMBOLIC REPRESENTATION OF THE NCM FRAMEWORK

The preceding consideration of the monetary policy strategy employed by the Fed in the post-crisis period perhaps breeds in the inquisitive reader familiar with the central tenets of the theoretical framework associated with mainstream monetary policy, namely, New consensus

macroeconomics, a sense of conflict: how can we reconcile the central bank's dominant preoccupation with inflation, a post-crisis policy mix centred on balance sheet expansion and ultra-low interest rate policy with the ongoing concern with deflation and weak economic growth nearly one decade after the deployment of the aforementioned policy on an unprecedented scale? To answer this question we undertake an examination and critique of the NCM policy framework with a twofold objective: first, to illustrate the theoretical inaccuracy and limitation of the central tenets on which this framework is based; and second, to lay the foundations for the sketching of the central pillars of a more accurate and insightful theoretical framework for monetary policy.

New consensus macroeconomics emerged as an amalgamation between two competing theoretical camps, namely the New monetarist and the New Keynesian frameworks of the 1980s (see section 1.8), and, as argued previously, introduced no revolutionary ideas but rather sought to create a theoretically-elegant and coherent compromise that lent itself effectively to applied policy analysis and decision making. The general approach was built around the notion that sound microfoundations (theories and assumptions drawn from the study of individuals employed in microeconomics) based on the idea of a rational RA that seeks to maximize a utility function or minimize a cost function and participates in an anonymous market with perfect competition and information, would provide solid groundwork for the study of macroeconomic relationships (Lengwiler, 2004, pp. 3-4).

The oversimplification and the unrealistic assumptions that such an undertaking required, the fallacy of composition that led to the incorrect supposition that rules that apply to an individual or firm necessarily apply to the aggregate economy (McCombie & Pike, 2012, p. 9), as well as a number of erroneous theories on which the NCM model is based, as will be illustrated shortly, resulted in a framework that failed to predict the crisis that shook the financial markets in 2008, crippling the US economy for years to come. Likewise, this framework failed to accurately predict the impact of policy, devised on its premises, on the longer-term performance of the crisis-stricken economy. To understand why, we consider a simplified but sufficiently accurate representation of the NCM framework that is given by a three equation model, which captures the central heuristics of this paradigm (drawn from Mankiw's popular textbook *Macroeconomics* (2009, pp. 410-415), frequently used in

intermediate-level university economics courses). In this model, output in the current period, y , is given by the so-called aggregate demand equation.⁵¹

$$\text{NC-1: } y = \bar{y} - \alpha(r - \rho) + \epsilon \qquad \alpha > 0, \rho > 0$$

The natural level of output, \bar{y} , is the starting point in this equation, whereby, in the absence of exogenous demand shocks, ϵ (such as changes in consumer sentiment, fiscal policy, and so on), monetary policy, theoretically, aims to set the interest rate such that current period output y is equal to the natural level of output \bar{y} . It is assumed that as the real interest rate, r , rises, borrowing becomes more expensive and results in decreased investment and spending and a higher rate of saving (the loanable funds theory). The level of sensitivity of demand to a change in the real interest rate is represented by the parameter α . Finally, ρ represents a Wicksellian natural rate of interest, a concept that is fundamental to monetary policy decision making within this model.

Inflation in the NCM framework is modelled by an expectations-augmented Phillips curve:

$$\text{NC-2: } \pi = E_0\pi + \varphi(y - \bar{y}) + v \qquad \varphi > 0$$

According to this equation, in the absence of an exogenous supply shock, v , current inflation, π , is a factor of previous-period expectations of current period inflation, $E_0\pi$,⁵² and the deviation of output from its natural level, $y - \bar{y}$, also referred to as the output gap.⁵³ The effect on inflation of the output gap depends on the sensitivity of inflation to the size of the output gap, represented in the equation by parameter φ . The theory that underlies the Fed's preoccupation with inflation and the management of inflation-related expectations can thus be glimpsed from this equation: it suggests that, aside from exogenous supply shocks, inflation can be managed by the monetary authorities via appropriate communication on the

⁵¹ Under the assumption of general equilibrium, whereby aggregate supply equals aggregate demand, and given the presumption that markets always clear, output and aggregate demand are used interchangeably in this equation.

⁵² Two alternative theories are used to model expectations formation in NCM: adaptive expectations theory presumes that inflation expectations are formed via the extrapolation of current-period inflation into the future, whereas rational expectations theory presumes a more complex process on the part of economic agents, which use all available information in forecasting future inflation.

⁵³ The Phillips curve equation can be rewritten using the deviation of actual unemployment from its natural rate, the unemployment gap. The difference is viewed as insignificant based on the idea that short-run fluctuations in output and employment present a strong negative (albeit highly unstable) statistical correlation. See Knotek II (2007) for a review of the validity and applicability of this so-called Okun's Law.

path of future policy, which moulds the market's expectations of likely future inflation scenarios, and by the maintenance of actual economic growth in line with potential growth, which, as equation NC-1 suggests, is done via the setting of the interest rate. Clearly, accurate estimates of both the natural rate of output/employment and the natural rate of interest are fundamental for the success of monetary policy in the achievement of its objectives under the NCM framework.

The last of the three principal equations that make up the model is the monetary policy rule, also referred to as the central bank's reaction function, and is a variant of the Taylor rule (Taylor, 1993). A version of this reaction function, as presented in Mankiw (2009, p. 414) is the following:

$$\text{NC-3: } i = \rho + \theta_{\pi}(\pi - \pi^*) + \theta_y(y - \bar{y})$$

The central bank sets a nominal target for the interest rate, i , which is a function of current period inflation, the natural rate of interest, the deviation of actual inflation from the central bank's target inflation, π^* , and actual output from the natural rate of output. The two parameters θ_{π} and θ_y determine the responsiveness of the central bank to the aforementioned deviations.

We see from equation NC-3 that the central bank in this model has an exclusive focus on the interest rate, and that monetary aggregates are entirely absent from the monetary policy rule, marking a significant change from the theory underlying the classical IS-LM tradition (see section 1.3). In this sense, money is treated as endogenous to the monetary system, but it is crucial to note that this endogeneity is different from the concept as it appears in post-Keynesian theory as, in the words of Gnos and Rochon (2007, p. 370), in the NCM framework "endogenous money is the result of the instability and unreliability of the demand for money", and hence "[t]he central bank simply chooses to allow money to be endogenous". As stated by Clarida et al. (1999, pp. 1683-1684), who are indeed influential economists representing the New Keynesian perspective, "it does not matter whether the central bank uses the short-term interest rate or a monetary aggregate as the policy instrument, so long as the money demand function yields a monotonic relation between the two variables". Monetary endogeneity is therefore a choice, rather than a fundamental and indisputable characteristic of the monetary production economy (see section 1.9).

2.5.2 FROM STATIC AD-AS TO DYNAMIC DSGE MODELLING

Although clearly a conceptual simplification, it is not inaccurate to say that the NCM paradigm is founded on these three fundamental equations belonging to the neoclassical tradition, from which the aggregate demand and aggregate supply curves are algebraically derived, theoretical long-run equilibrium values of the endogenous variables (in equilibrium equal to the natural values of the exogenous variables) are calculated, and from which the short-run equilibrium can be deduced by finding the intersection of the aggregate demand (AD) and aggregate supply (AS) curves (for a heterodox evaluation and criticism of this model see Arestis & Sawyer, 2004; Lavoie, 2004; Setterfield, 2004; McCombie & Pike, 2012). This static representation of the economy in equilibrium is algebraically elaborated into a dynamic model via the substitution of the endogenous variables with exogenous ones that respond, within the model, to the actions of the central bank (with effects of fiscal policy, together with other possible aggregate demand shocks, relegated to the term ϵ).

Within the model, central bank policy works to either stimulate spending and investment via the lowering of the interest rate (expansionary policy) or to dampen aggregate demand by the raising of the interest rate (contractionary policy) (Mankiw, 2009, pp. 418-423). Behind this mechanism lies the assumption of temporary wage and price rigidity, an idea belonging to the old Keynesian tradition (see section 1.4). However, contrary to Keynes's belief that such wage and price rigidity, if not accommodated by monetary policy, could lead to the re-establishment of a new equilibrium at a lower level of employment, NCM theory permits only a short-term central bank impact on the economy (Clarida et al., 1999, p. 1662). In the long term, once prices and wages have readjusted accordingly, monetary policy is presumed to be neutral (and an inappropriate central bank policy reaction is reflected exclusively in higher rates of inflation), a characteristic viewed as fundamental in a framework ultimately based on the neoclassical quantity theory of money. Since in this model markets always clear, once readjustment to equilibrium has occurred, no involuntary unemployment remains.⁵⁴

Closer to the frontier of academic research, the textbook dynamic AD (DAD)-dynamic AS (DAD-DAS) framework has benefitted from various additions to the basic model, which nonetheless forms the skeleton of most mainstream macroeconomic analysis. For example, Alpanda et al. (2013, pp. 147-148) propose an alternative, more sophisticated and in their view realistic approach to modelling inflation expectations,

⁵⁴ This concept has created significant controversy even amongst proclaimed old monetarist. See Modigliani's critique in section 1.5.

$$\text{NC-4:} \quad E_t \pi_{t+1} = \gamma * \pi_t + (1 - \gamma) * \pi_{t+1}^{target}$$

whereby the present period's expectations regarding next-period inflation are formed not only via adaptive expectations (a theory that presumes that inflation expectations are derived via the simple extrapolation of current-period inflation into the future), but in a more complex process (assuming rational expectations) that takes into consideration the central bank's target for inflation, π_{t+1}^{target} (γ and $1 - \gamma$ are parameters that assign respective weights to the two elements of the decision-making process).

Perhaps the most monumental methodological elaboration of the DAD-DAS model is based on the pioneering work of Kydland and Prescott, who introduced multiple periods into their dynamic general equilibrium model (1982), making the first steps towards the creation of mathematically and statistically sophisticated dynamic stochastic general equilibrium (DSGE) models that have become the mainspring of economic analysis. As can be deduced from one such model elaborated by Clarida et al. (1999), a model they describe as simple but representative of more complex models used in policy analysis (p. 1662), the central elements of the underlying theory are largely in line with those laid out above. Temporary nominal price rigidities permit short-term non-neutrality of monetary policy; the central bank delivers its policy via changes in the policy rate of interest; market participants, based on the model of representative agent, use optimization in decision making based on expectations of future monetary policy; the central bank responds to changes in inflationary dynamics (which are caused by output 'disturbances', or rather, changes in the output gap) in an implicit inflation-targeting regime that aims to readjust aggregate demand via changes in the real rate of interest, and so on.

To this brief description of Clarida et al.'s much-quoted model can be added a number of more general characteristics of standard DSGE models used in empirical economic analysis. As illustrated by the above description, the theory on which they are based is drawn mostly from the New Keynesian school of thought; the models maintain the general equilibrium assumption for all markets; profit maximization and cost minimization are the assumed forms of behaviour of the representative individual and firm; models are stochastic in that they include variables representing random, unpredictable occurrences and shocks that impact economic activity and the behaviour of market participants; and they are dynamic in

that they incorporate the role of expectations in determining the values of current variables, with an average error of estimation equal to zero⁵⁵ (Dotsey, 2013, p. 11).

DSGE models generally assume that consumption, output, investment and wages grow at the same rate (*ibid.*, p. 15), and hence the changing role of debt is not taken into consideration and plays no role in economic activity. In fact, modelling of the financial sector in DSGE models is notoriously weak and generally is done via the financial accelerator approach (Tovar, 2009, p. 6). This approach was first introduced by Bernanke et al. (1998), who hoped to improve the power of standard dynamic macroeconomic models to explain cyclical fluctuations in output, aggregate demand, credit extension and interest rate spreads via the incorporation of credit market frictions.

This effort was made on the recognition and mounting empirical evidence that, contrary to the prescription of the famous Modigliani-Miller theorem on the irrelevance of the financial structure to real economic outcomes, cash flow, leverage, informational asymmetries, bankruptcies, agency problems and other credit market imperfections have an important impact on economic activity (Bernanke et al., 1998, pp. 2-3), and involves the incorporation of a financial accelerator into a standard dynamic general equilibrium model. More specifically, the process implies the introduction of an endogenous variable representing an external finance premium (the spread between externally and internally raised funds available to a representative firm), which is inversely related to borrowers' net worth and which acts to counter-cyclically impact borrowing, investment, spending and production (*ibid.*, pp. 4-5). While certainly an improvement over models that entirely neglect the role of financial frictions, this approach to modelling the financial sector is highly insufficient in that it captures only one of the many ways in which financial markets work to determine economic activity (Mishkin, 2011, p. 12).⁵⁶

The theoretical assumptions of standard DSGE models with regards to interest rates, and the approach to modelling them, are also highly unsatisfactory. Models that represent a single market rate of interest are clearly unrealistic given the variety of market rates that create important dynamics in capital markets,⁵⁷ though credit is deserved to recent efforts to incorporate several rates representing different asset markets in DSGE models, at the cost of a significantly increased level of complexity. Appropriate modelling of the term structure of interest rates also remains a major challenge, as most DSGE models rely on the expectations

⁵⁵ The zero long-term bias assumption is a mathematical certainty underlying the rational expectations theory.

⁵⁶ For a more technical critique of the DSGE modelling approach see Caiani et al. (2016, pp. 2-3).

⁵⁷ Interest rates are analysed theoretically and empirically in the subsequent chapter.

hypothesis, which suggests that the shape of the yield curve is determined by expectations for current and future spot rates. Furthermore, modelling of the structure of interest rates in the benchmark DSGE model relies on the theory represented by the neoclassical IS curve, which assumes a direct relationship between the real interest rate and output (see section 1.3), or similarly, the DAD (NC-1), whereby the sequence of endogenously-determined short-term real interest rates act to determine the path of aggregate demand, with the role of the term and risk premiums generally neglected (Mankiw, 2009, p. 417; Tovar, 2009, pp. 7-8).⁵⁸

This assumed structure of interest rates is questionable, since the expectations hypothesis is not supported by empirical research when realized spot rates, rather than current long-term rates of interest, are considered (Carpenter & Demiralp, 2011) and suggests that realized interest rates follow a random walk and are thus essentially unpredictable (Guidolin & Thornton, 2008). In fact, this approach has received criticism even within the NCM theoretical framework based on the existence of empirical evidence that risk premia “create a ‘wedge’ between expectations over the path of future policy rates and long-term interest rates” with significant complications for policymakers who “may implicitly have to account for a decoupling of short- and long-term domestic interest rates, and for the possibility that long-term interest rates are influenced by factors beyond expected rates and domestic shocks” (Chin et al., 2015, p. 1).

Curiously, former Fed Chairman Alan Greenspan has notoriously referred to the decoupling of short- and long-term interest rates as a “conundrum”, given the inability of the mainstream theoretical framework to offer a valid explanation of this phenomenon (Rudenbusch et al., 2006, p. 2). This drawback in mainstream models is further compounded by the neoclassical imposition of the ‘natural rate of interest concept’, which is theoretically questionable and impossible to calculate (see section 1.5), while wielding a significant power in determining a model’s resulting output. Finally, the effectiveness of monetary policy, which is presumed in the NCM framework to work by impacting interest sensitive components of aggregate spending, is restricted at the zero lower bound in DSGE models, which generally explicitly express this constraint. Their usefulness in analysing the role of monetary policy in stimulating the economy when interest rates approach this lower bound is therefore limited.

⁵⁸ The relationship between real and nominal interest rates is represented by the Fisher equation $r = i - E\pi_0$, and the relationship between the n-year forward rate and future spot rates within the expectations hypothesis of the term structure of interest rates is given by the geometric mean of spot rates in the form $(1 + i_{fwd})^n = (1 + i_{spot}^{n=1})(1 + i_{spot}^{n=2}) \dots (1 + i_{spot}^{n=n})$

2.5.3 A POST-KEYNESIAN CRITIQUE OF NEOCLASSICAL DSGE ASSUMPTIONS

As will be discussed in greater detail in the subsequent section, the post-Keynesian framework challenges some of the fundamental assumptions taken in modelling interest rates within the NCM paradigm. Post-Keynesians reject the idea of a natural rate of interest not only on the premise that such a rate is virtually impossible to calculate with any amount of certainty, but also because it is believed to be theoretically and empirically flawed and to lead to an inaccurate and misleading characterization of the mechanisms via which monetary policy impacts economic activity (Smithin, 2004, p. 62; Gnos & Rochon, 2007, p. 377). Rather, the interest rate is most appropriately defined as an exogenous variable, given the central bank's commitment to fully satisfy the demand for reserves at any given level of interest rates (represented by a perfectly horizontal money supply curve), and is comprised of the base rate (determined by the central bank) and a risk premium (determined by commercial banks' liquidity preference), the latter of which determines the term structure of interest rates.

The central bank thus determines only the short-term risk-free rate of interest, while short- and long-term market rates are to a significant extent beyond its control; as such, the central bank's efforts to decrease the market rate of interest may be futile, if banks simultaneously increase the required rate of return (that is, the term and risk premia) because of a shift in liquidity preference (Arestis & Sawyer, 2004, p. 77; Hein, 2010, pp. 4-7). This theoretical approach has been readily adopted in financial theory, and has been illustrated by Rudenbusch et al. (2006, p. 26) (albeit in a somewhat incomplete manner, since liquidity preference is captured exclusively by a measure of implied volatility of long-term Treasuries, a measure of uncertainty related to future interest rates) to be the most valid, though partial, explanation of the so-called bond yield 'conundrum', or more precisely, of the decoupling of short- and long-term interest rates.

Beyond an alternative view of interest rate theory and the disapprobation of the generally neglected financial sector, the post-Keynesian critique of the NCM framework is comprehensive. In addition to their rejection of the concept of a Wicksellian natural rate of interest central in the determination of aggregate demand (NC-1), post-Keynesians challenge the mechanism by which a central bank-driven rise in the real interest rate results in decreased investment, borrowing and spending (and consequently a reduction in leverage ratios) and a higher rate of saving.⁵⁹ On the contrary, post-Keynesian theory proposes an inverse relationship, the so-called paradox of debt, whereby higher interest rates (associated

⁵⁹ In the textbook presentation of this mechanism, there continues to be reference to the link between a change in the policy rate of interest and a contraction/increase in the money supply (see Mankiw, 2009, pp. 415-416).

with times of stronger economic performance), are accompanied by increased borrowing (in a context of optimism and ample investment opportunities), higher investment and profit, and lower debt-capital ratios. Likewise, a decrease in the risk-free rate of interest in this analytical framework may be associated with investors' negative expectations of future effective demand, less investment, lower profits and higher debt ratios (see section 5.2.2 for an elaboration; Lavoie, 1995, p. 174; Hein, 2010, p. 24; McCombie & Pike, 2012, p. 10).⁶⁰

Although this theoretical approach undermines the neoclassical mechanism through which monetary policy mechanically and explicitly adjusts the aggregate level of output via a change in the rate of interest as prescribed by the monetary policy rule, the post-Keynesian framework proposes an alternative, more significant channel through which monetary policy may impact economic activity in the long term. To understand the post-Keynesian approach to the analysis of monetary policy transmission on a broad theoretical level, a task relegated to the subsequent section, we turn to the examination of the concept of potential output and an evaluation of the critique that post-Keynesians have successfully raised.

The concept of 'potential output' is fundamental in the NCM framework, as illustrated by its presence in all three of the equations that form the backbone of NCM theory. As such, the growth rate of \bar{y} , an exogenous variable within the neoclassical framework, is dependent on factors such as population growth, capital accumulation and technological progress (Mankiw, 2009, p. 423), and the DAD-DAS framework therefore has nothing to say about the value, relative or absolute, of this variable. Most important for the discussion at hand is the variable \bar{y} 's inclusion in the monetary policy rule (equation NC-3), where its value plays a fundamental prescriptive role in determining the course of monetary policy. Despite the importance of this theoretical concept, there is no real agreement amongst mainstream economists and practitioners on how to define potential output, and different approaches result in considerably different results.

In applied economics, potential output is frequently found by considering a smooth trend for GDP based on historical data, using one of a number of statistical techniques. In theoretical literature, various statistical and modelling techniques are used to estimate an

⁶⁰ Despite the apparent contradiction of this theory with Minsky's instability hypothesis, which is endorsed in this dissertation (see section 5.2.3), a thorough consideration of both affirms their compatibility, as the dynamics that these theories aim to capture are quite diverse. While Minsky addresses a process of purposeful debt accumulation that is characterized by unfounded optimism, increasing risk-taking and (albeit temporary) profitability, which eventually and inevitably ends in a financial catastrophe, the paradox of debt aims to emphasize the disconnect between the monetary policy stance (say, expansionary) and dynamics in aggregate demand (characterized by pessimism, low investment and risk appetite, low corporate profits and 'involuntary' increases in debt ratios). See Soon Ryoo (2013) for a formal evaluation of these theories and the underlying logic.

‘efficient’ level of output that would prevail in an equilibrium characterized by the absence of nominal rigidities (Edge et al., 2007, p. 14; Curdia et al., 2011, p. 1).

Given that the concept of ‘potential output’ is generally equated to the notion of a ‘natural level of unemployment’ in the neoclassical framework (see footnote 51), the specific formulation of NCM theory on the basis of three equations that include the concept of \bar{y} holds significant implications for the theory of employment underlying this framework. Most notably, shifting focus to the concept of unemployment in the interpretation of variables \bar{y} and y , we see from equation NC-1 that, in the absence of exogenous shocks, when the real rate of interest is equal to the ‘natural’ rate of interest, all markets are in equilibrium, actual unemployment is equal to its ‘natural’ level, or the non-accelerating inflation rate of unemployment, NAIRU (see section 1.5); it implies that all temporarily unexploited opportunities have been exploited, short-term nominal wage rigidity has been corrected, returning wages to their equilibrium, market-clearing levels, and involuntary unemployment is equal to zero (McCombie & Pike, 2012, p. 10).

Post-Keynesian theorists disagree with this definition of potential output, the role NCM theory assigns to it in determining the long-term state of production and employment, and the view that monetary policy impacts the level of output only in the short run. Instead, post-Keynesians postulate that monetary policy potentially plays an important role in determining output in both the short and the long run, in as far as present economic performance determines future (endogenously-determined) rates of economic growth (Hein, 2009; Ball, 2014; Bassi & Lang, 2016);⁶¹ contrary to NCM theory, which posits that actual output gravitates towards potential output in the long run, a definition of economic growth as endogenous and path-dependent implies that it is potential output (an elusive concept at best; see section 5.2.1) that gravitates with time towards actual output; monetary policy is thus non-neutral in the long run because of its impact on actual output, which follows a path-dependent trajectory. Central to the determination of the growth rate of potential output is investment and the rate of accumulation of capital in the short run, which is dependent, in

⁶¹ See also Skott (2008, p. 845) for a related discussion and formalization of the concept of endogenous growth in a post-Keynesian model, whereby full employment is presumed to never be attained and, hence, labour supply is infinitely elastic and the employment rate is no longer part of the growth function.

part, on the stance and effective management of monetary policy⁶² (see section 5.4; Dalziel, 2002, p. 524, Lavoie, 2004, pp. 24-25, Gnos & Rochon, 2007, p. 378).⁶³

Post-Keynesians also disagree with the NCM supposition that unemployment is caused by temporary wage rigidity that is corrected in the long run, resulting in zero long-run involuntary unemployment. Rather, in the aggregate, price stickiness disappears in the absence of perfect correlation of individual firm's constraints, and unemployment is caused by a fall in aggregate demand that induces firms to cut production and demand for labour, resulting in involuntary unemployment that cannot be corrected by falling wages. In addition, a fall in wages results in a further fall in aggregate demand and production, acting to further aggravate conditions in the labour market (McCombie & Pike, 2012, pp. 17-18).

Post-Keynesians thus reject the neoclassical formulation of the downward sloping short-run Phillips curve (equation NC-2), which relates inflation to the output/employment gap and which assumes that, given appropriate and successful management of inflationary expectations, the rate of change of the price level can be effectively stabilized simply by maintaining the level of employment in line with its potential. As such, reliance on inflation targeting by the monetary authorities is contrary to the central tenets of post-Keynesian monetary theory, which, aside from the Phillips curve relationship, also rejects the neoclassical exogenous natural rate of growth and Wicksellian natural rate of interest, and instead bases its analysis of inflation on cost-push factors and structural changes in the economy (see section 1.13),⁶⁴ rather than previous-period expectations and excess demand as defined by the output gap.

In spite of such significant theoretical shortcomings, the neoclassical Phillips curve, potential output and the natural rate of interest are concepts that are integral to the validation of the inflation-targeting regime that has been adopted by a significant number of central banks around the globe over the past two and a half decades (Hammond, 2012, p. 7). The Federal Reserve, which for many years had differentiated itself from its major counterparts (including the European Central Bank, the Swiss National Bank, the Bank of England and,

⁶² This discussion has also been formulated in terms of the potential long-run endogeneity of the NAIRU (Hein & Stockhammer, 2010, p. 319), as well as in terms of the endogenous, path-dependent nature of economic growth subject to a continuum of equilibria, full hysteresis and irreversibility (Lavoie, 2004, p. 26). See section 2.6 for a complete discussion of these concepts.

⁶³ Neoclassical theorists are not entirely ignorant of this process, especially since the 2008 financial crisis. However, while these interlinkages have been central to post-Keynesian theory for some time, for many mainstream macroeconomists they are recent observations outside of formal theory. For example, Mishkin (2011, p. 23) refers to the "adverse feedback loop", stating that "[t]he events of the Lehman Brothers bankruptcy showed how nonlinear both the financial system and the macro economy could be".

⁶⁴ See also section 5.2.3 for an important discussion of the structural flaw in the existing domestic payments system as the cause of inflation in the goods and financial assets markets.

notably, the Reserve Bank of New Zealand, the first to adopt explicit inflation targeting in 1989) by refusing to commit to an explicit inflation target (thus pursuing a policy of “flexible inflation targeting” (Mishkin, 2011, p. 15)) switched to explicit inflation targeting in 2012. The nomination of a 2 percent target for medium-term inflation may be considered a significant victory for Chairman Ben Bernanke, who had endorsed and promoted the policy of inflation targeting over the course of his academic and policy-making career.

The rationale behind this monetary policy approach is founded on the view that inflation targeting promotes transparency, accountability, and central bank credibility, and that it provides a crucial anchor for inflationary expectations, resulting in stability in output and inflation (Mishkin, 2001). However, this framework, succinctly presented in one of Mishkin’s more recent publications (2011), is based on a number of questionable, and more likely erroneous, neoclassical assumptions and policy prescriptions, amongst which are the quantity theory of money (p. 3), the natural rate of unemployment (p. 6), the Taylor principle (p. 7), and the view that the central bank is able to effectively control the rate of inflation (p. 10). Furthermore, cost-push inflation is generally disregarded by supporters of inflation targeting, as explained by Rochon and Rossi (2006, p. 620), on the basis of the view “that supply shocks are either transitory in nature or will cancel each other out as a random walk”.⁶⁵ On the contrary, a post-Keynesian analysis of the causes and effects of the two types of inflation (see section 1.13) leads to the suggestion that inflation targeting is theoretically unfounded and practically ineffective (see also the post-Keynesian analysis by Davidson (2006) as well as the empirical results of Malikane and Mokoka (2014), which highlight the statistical weakness of the NCM approach to the analysis of inflation dynamics).⁶⁶

Notwithstanding these generally divergent views between mainstream and heterodox economists⁶⁷ on the effectiveness of the inflation-targeting regime, there is one essential area of agreement between the two camps, namely, the importance of expectations in the transmission of monetary policy. The subject of the precise role that expectations play in

⁶⁵ While in practice central banks do actually consider supply-side shocks in the formulation of policy, the theoretical framework which formalizes current monetary policy decision making, as represented by the NCM model, considers such variables as exogenous to the process of the setting of the interest rate (the monetary policy reaction function – see equation NC-3).

⁶⁶ In fact, recent mainstream empirical work is moving in the direction of post-Keynesian theory in modelling inflation dynamics. See, for instance, the New Keynesian work of Benigno and Fornaro (2016, p. 11), who model inflation as wage inflation.

⁶⁷ The categorical rejection of the RA framework and the assumptions of rational expectations, which form the basis of the neoclassical view on the formation of expectations and economic decision making, are not exclusive to the post-Keynesian school of thought. Theorists from the fields of institutional economics and behavioural finance have made significant contributions to developing alternative frameworks for studying individual behaviour and decision making, hence reference to ‘heterodox’ economists in the subsequent discussion.

economic decision making and the mechanism via which they influence economic outcomes opens up an additional area of academic deliberation, conclusions of which have potentially significant implications on the design and implementation of monetary policy (see section 5.4 for further consideration of this subject). As discussed previously, in the NCM framework expectations formation is defined on the basis of the RA theory and rational expectations, which assume optimization, maximization, complete information, unbiased decision making and time-consistent preferences. Central bank communication, particularly quantitative or qualitative forward guidance, is thus fundamental to the harnessing of the public's expectations, which in turn is imperative to the success of the inflation-targeting regime. Forward guidance, which offers explicit targets for the path of the policy rate of interest, is expected to affect long-term interest rates by influencing the expected spot rates at given maturities along the yield curve, according to the expectations hypothesis of the term structure of interest rates (see section 4.6 for further elaboration).

However, the use of the theory of expectations in a mechanical way in economic models is controversial, since the same monetary policy signal may create greatly differing expectations amongst market participants. For example, a commitment to low future interest rates by the monetary authorities may be interpreted by economic agents as a commitment to continued monetary policy stimulus, which may boost investment and aggregate demand on the perception of improved future economic prospects; alternatively, the same signal may be interpreted as negative news based on the hypothesis that the central bank has exclusive (negative) information on the state of the economy, resulting in depressed investment and aggregate demand (Del Negro et al., 2012, p. 2). Furthermore, given that the central bank is unlikely to issue forward guidance that reflects expected future economic or financial turbulence, Gersbach and Hahn (2008, p. 8) argue that this policy suffers from a credibility constraint that skews the process of expectations formation based on central bank communication.

Central bank efforts to mould market expectations may prove not only ineffective, but even counterproductive; such efforts may have the negative impact of diverting market expectations from fundamentals, thus weakening the market's forecasting capacity. Economic agents may overreact to public information at the expense of private information (Morris & Shin, 2002, p. 1522), or public announcements may be entirely misinterpreted. For example, on 17 June 2013, when Chairman Bernanke announced that the Fed would begin 'tapering' asset purchases in 2014, based on a positive assessment of economic prospects, the news was interpreted as an implicit promise of 'tightening', which resulted in immediate

equity market plunge and a sharp rise in interest rates at the long end of the yield curve (Harding & Politi, 2013). Recent evidence of the loss of central bank credibility is an additional problem that the Fed is being forced to confront and is a by-product of the post-Lehman crisis economic developments, particularly, anaemic economic growth and lack of investment in spite of unprecedented levels of monetary policy stimulus. Specifically, there is increasing anecdotal evidence that market participants are beginning to lose faith in the proclaimed capacity of monetary policy to influence the economy in ways predicted by neoclassical models (see section 4.6; Schunknecht, 2015, Internet).

The growing disillusionment and increasing uncertainty over the ability of the traditional monetary policy channels to deliver much-needed economic stimulus and to control inflation create the ever-more urgent need to develop a new, more effective perspective from which to analyse the mechanisms of expectations formation and to evaluate the characteristics of the underlying decision-making process. Contrary to mainstream economists, heterodox economists have rejected the representative agent model and the assumptions implicit in this framework (Kirman, 1992; Landmann, 2014, pp. 13-14), focusing instead on the analysis of individual behaviour, rather than on the aggregate, and embracing ideas emanating from other areas of economic research, particularly from the field of behavioural economics.⁶⁸ In this respect, the only similarity of the heterodox perspective on this subject with that of the NCM analytical framework is the importance that both assign to expectations in determining economic outcomes; however, while in NCM this regards primarily inflation, in the heterodox view, particularly the post-Keynesian perspective, expectations are critical in the determination of effective demand, investment and thus, ultimately, economic growth (see section 1.3).

Keynes's famous reference to the determinants of individual expectations as 'animal spirits' underscores the seeming irrationality and intangibility of individual decision making, while the idea of individual beliefs in the aggregate as 'self-fulfilling prophecy' highlights the importance of the ultimate direction of such decision making in determining economic

⁶⁸ Recent innovations in the heterodox approach to modelling individual behaviour and expectations formation have provided fruitful alternatives to the mainstream representative agent. Agent-based models, for instance, aim in their design to reflect the complexity, heterogeneity and interconnectedness of individual agents' behaviour, allowing researchers to model in a realistic fashion diverging behaviour of various agent groups (Caiani et al., 2016), endogenous learning processes (Salle et al., 2013), and crucially, proving to reflect accurately a variety of important financial dynamics and market imperfections (Caiani et al., 2016, pp. 5-6). While these innovations are a vital improvement in the representation of agents in economic models, these efforts are complicated by the inevitable presence of an 'irrational' element of decision making, discussed next.

outcomes (Krugman, 1989; Greenwald & Stiglitz, 2003, pp. 290-291). In addition, recent research has underscored the importance of informational imperfection (Greenwald & Stiglitz, 2003, p. 4), coordination failures (Delli Gatti et al., 2010), irrational behaviour, and radical uncertainty (Bezemer, 2009, pp. 25-27) that characterize decision making and the resulting economic outcomes. Irrational behaviour has been attributed to speculation mentality, unfounded exuberance based on a 'new era' conviction or, in the more extreme situation, has been likened to a gambling addiction (see Bezemer, 2009, pp. 25-26, for a review of literature on this subject).

Clinical research in fields traditionally disregarded by researchers in theoretical economics has, in recent years, made significant progress in the understanding of human psychology, physiology and the resulting individual and aggregate behaviour. These contributions should be considered additional sources of explanatory power of economic and financial phenomena that economists seek to explain, predict and, to some extent, influence via appropriate and legitimate policy implementation. For example, the RA assumption of stable risk preferences has been contradicted by the finding of an important scientific study that points instead to the dynamic nature of risk preferences, which are governed by psychology-induced physiological changes instigated by variations in the level of a stress hormone called cortisol; rising levels of cortisol have been found to increase risk aversion at times of market volatility and uncertainty, with the opposite occurring when market volatility is minimal (Kandasamy et al., 2014).

In a similar vein, reviewing the conclusions of clinical research undertaken in the field of behavioural economics, DellaVigna (2007) presents field evidence that characteristics of individual psychology contrast starkly with the assumptions of the RA framework. Specifically, hypotheses supported by laboratory experiments and subsequently tested within simple quantitative models using field evidence highlight that the individual's decision-making process is characterized by: (1) self-control problems in intertemporal decision making that violate the classical assumption of time consistency (that is, individuals prefer immediate to future payoffs) (pp. 3-4); (2) inconsistency in risk-taking behaviour characterized by asymmetry in willingness to pay versus willingness to accept, loss aversion, prevalence of small-scale insurance and so on, which contradicts the classical assumption of a global utility function that the representative agent maximizes over a lifetime (pp. 10-20); (3) social preferences that violate the assumption of consumers in exclusive pursuit of personal benefit (self-interested representative agent), characterized by generosity and charitable giving, and positive/negative effects on employees' productivity of workplace relations (pp.

20-25); (4) expectations errors owing to overconfidence, law of small numbers (whereby consumers assume large-sample statistical properties in small samples) and projection bias (the projection of current preferences into the future) (p. 25); (5) and finally, non-standard decision making that violates assumptions of individuals that observe and act in accordance with a utility function as a result of a number of individual behavioural and social phenomena (p. 29). The research surveyed by DellaVigna provides a more unequivocal and methodical explanation of what Keynes, many decades earlier, had crucially termed ‘animal spirits’.

Clearly, the convenient simplifying assumptions of the RA framework that is central to the analysis of the behaviour of economic actors in the aggregate within NCM models is far removed from actual behaviour of individuals, which is subject to numerous physiological, psychological and sociological influences. Furthermore, there is no convincing evidence that these ‘imperfections’ of individual decision making and behaviour cancel out when considered from a macroeconomic perspective. Relying on the obviously inaccurate representation of individual and aggregate behaviour of the RA framework therefore has serious implications on the evaluation of monetary policy transmission and leads to incorrect conclusions in the design of monetary policy. For example, as pointed out by Arestis (2009), an explanation of banks’ unwillingness to lend in the period immediately following the 2008 financial crisis, and the resulting impotence of monetary policy, in spite of significant recapitalisation efforts and near-zero interest rates, requires a perspective beyond the representative agent that takes into consideration the effects of uncertainty on market confidence and decision making within the banking sector⁶⁹ (p. 14).

2.5.4 FROM THEORY TO PRACTICE: BRIEF EXAMINATION OF THE FED’S FRB/US MODELS

Keeping in mind the erstwhile critique of the mainstream theoretical paradigm for monetary policy analysis, we digress momentarily from the analysis of the framework employed predominantly in the field of academic research to consider its comparability with the models, jointly known as FRB/US, used by the Federal Reserve in actual policy formulation. Recognizing the drawbacks of the many theoretically-based simplifying assumptions used in the majority of DSGE models, the Federal Reserve has developed a complex set of models, which it uses alongside more traditional DSGE models to enrich the forecasting and policy-

⁶⁹ The process of desired deleveraging by households and corporations (in other words, the unwillingness to borrow to spend) must also be understood in a context of uncertainty and lack of confidence in current and future economic performance (see sections 3.1.1 and 3.1.2). For a consideration of these dynamics in the context of the ‘balance sheet recession’ theory, see section 5.2.2.

making process of its staff. While these models allow for deviations from certain clearly unrealistic and problematic assumptions, such as rational expectations and the existence of a single rate of interest, not all of the assumptions may be relaxed simultaneously and, on the whole, “[t]he general design of FRB/US shares many features with the ‘New Neoclassical Synthesis’ [NCM] class of models” (Brayton et al., 2014, Internet).

In FRB/US models, agents are assumed to exhibit optimizing behaviour; nominal rigidities explain short-term deviations from equilibrium caused by exogenous shocks; the level of firms’ investment spending is the output of an optimization equation that captures a number of factors including the user cost of capital, depreciation and the expected level and growth rate of output,⁷⁰ but which largely neglects the firms’ (in)ability to secure financing from risk-averse banks at times of tight credit conditions;⁷¹ the federal funds rate is modelled using a monetary policy rule much like the one in the basic NCM model described above, relying on heuristic concepts such as the output gap, a steady-state real short-term interest rate (natural rate of interest) and the inflation objective, though admittedly the FRB/US models make an improvement over many standard DSGE models’ assumption of a single interest rate by incorporating a variety of market rates that exhibit an endogenously-determined term/risk premium; further, inflation is modelled using a New Keynesian Phillips curve and is determined by the output gap and expectations, as in the basic model, with the favourable addition of cost-push inflationary factors in the food, energy and non-energy imports markets (*ibid.*).

Although the FRB/US models contain circa fifty equations that allow for alternative specifications of expectations formation by economic agents, reflecting the recognition of the complexity of this process (Brayton et al., 1997, p. 235), there appears to be little scope for modelling ‘irrational’ behaviour or actions that go beyond pursuit of self-interest or welfare maximization. Finally, much as in the basic neoclassical model described above, the FRB/US models employ the concept of potential output growth that in the long term is dependent on the natural level of employment, which, in turn, is determined by characteristics of the population and two stochastically-determined aggregate trends in the participation rate and the workweek (Brayton et al., 2014). This representation stands in stark contrast to the post-

⁷⁰ In this assumption we get a glimpse of Keynesian emphasis on the influence of effective demand on investment spending.

⁷¹ In our framework, this dynamics is limited to the immediate post-crisis period (a detailed consideration of which is outside the scope of this dissertation), when interbank markets do not function correctly. In normal times, banks’ decisions to provide credit to credit-worthy borrowers are purely profitability-based. However, as we will see, post-crisis dynamics, albeit temporary, have critical implications for endogenous growth dynamics (see section 5.2.2 for an elaboration).

Keynesian emphasis on endogenously-determined rates of economic growth (section 2.6.1, Chapter 5; Ball, 2014; Bassi & Lang, 2016), multiple possible employment equilibria and the possibility of existence of long-term involuntary unemployment.⁷²

Although it is well beyond the scope of this dissertation to provide a thorough analysis of the theoretical assumptions and statistical methodology used in the FRB/US models, it is paramount to accentuate the significant similarity with the basic New Keynesian model described above, so as to illustrate that the aforementioned criticism of the NCM models' assumptions is well founded and that a revision to the theoretical assumptions on which this framework is based is critically necessary, if the monetary policy paradigm is to reflect more accurately the structure and dynamics of the modern monetary economy, and if monetary policy is to act more effectively to promote financial stability and maximum long-term economic growth (see section 2.2.2 and the thorough elaboration in Chapter 5). In an insightful articulation of the status quo in macroeconomic analysis, Colander et al. (2008) underscore the daunting nature of the task facing economists: they argue for a much-needed collaboration of highly-specialized experts from a variety of fields including econphysics, statistics and mathematics, in addition to the more traditional fields of theoretical and empirical economics, and for the employment of cutting-edge technology in building complex models that move beyond the reductionist, restrictive and unrealistic assumptions of standard DSGE, even at the risk of significant complications. Quoting biologist Stuart Kaufman, who once remarked that “[a]n organism in equilibrium is dead”, Colander et al. (2008) argue for the need to study “*system equilibria*, in which agent disequilibria offset each other so that the aggregate system is unchanging, even though none of the components of the individual agents in the model are in equilibrium” (pp. 5-6). In consideration of this view, the objective of the subsequent section is to sketch a blueprint for an alternative framework on the theory of central banking, founded on proposals put forth by heterodox, particularly post-Keynesian, economists, within which a detailed theoretical and empirical analysis of the transmission channels of monetary policy can be undertaken in the subsequent two chapters.

⁷² As will be argued in Chapter 5, even mainstream literature is beginning to adopt these crucial post-Keynesian concept in formal models (see, for instance, the New Keynesian approach of Benigno & Fornaro, 2016, who model an economy with endogenous growth, incorporating the possibility of involuntary unemployment).

2.6 KEY POST-KEYNESIAN PROPOSALS ON THE THEORY OF CENTRAL BANKING

“Some argue that complexity implies a new philosophical perspective on how humanity relates to nature and the world, indeed on how each individual does so, replacing formal deduction with inductive or abductive methods as analysts seek to understand an ever-changing and evolving complex reality” (Rosser Jr., 2006, p. 76).

2.6.1 COMPLEX DYNAMICS OF NON-ERGODIC SYSTEMS AND THE MUTUALLY-RECURSIVE NATURE OF GROWTH DETERMINANTS

As suggested by influential economist Rosser Jr. in the above quote, recent advances in economic theory, and the even more recent colossal failure of mainstream economics to accurately foresee and explain the financial calamity that occurred in the years shortly after the publication of Rosser’s contribution, have brought to light the importance of complex dynamics and fundamental uncertainty that are inherent to economic systems, and the insufficiency of reductionist linear equilibrium analysis that has been so eagerly adopted and applied in the recent decades by mainstream neoclassical economists.

We recall that the neoclassical approach to economic analysis views economic dynamics as an ergodic⁷³ stochastic process governed by pre-existing parameters, or market fundamentals, and which presumes that, given rational decision making, perfect information and perfectly efficient capital markets in the long run, economic outcomes are predictable with relative accuracy given estimated probability distributions of inputs to the underlying model; furthermore, given the process’ ergodicity, it is irrelevant whether the statistical data sample is drawn from the past, the present or (hypothetically) from the future (Davidson, 2012, p. 60). While the assumption of ergodicity, a concept borrowed from the fields of physics and mathematics, is a useful statistical assumption that can be used in designing a model for specific experiments limited in scope and timeframe, it is not a construct that can accurately be applied in defining economic systems. The ergodic hypothesis was notoriously defended by Paul Samuelson, who argued that the most reasonable prediction made today of economic events in the future would rely on the assumption that economic events follow a “‘stable’ stochastic process (one that in a genuine sense eventually forgets its past and therefore can be expected in the far future to approach an ergodic probability distribution)” (Samuelson, 1976, p. 2); however, the ergodic axiom is on the whole incompatible with a post-Keynesian framework of economic analysis, which underscores the endogenous, hysteresis-augmented and path-dependent nature of economic growth.

⁷³ The concept of ergodicity, as generally applied to economics, presumes that “the economic future is already predetermined” (Davidson, 2012, p. 2).

At the heart of the rejection of ergodicity in economic analysis are the concepts of Keynesian ‘radical uncertainty’, ‘animal spirits’ and the complex network of interlinkages that determine the nature of interaction of economic agents and define the subjective, frequently irrational and unpredictable process of economic decision making, all of which in turn influence actual economic outcomes.⁷⁴ The theory of complex dynamics, which has been developed within and applied to a variety of different disciplines, is richly informative and deserves consideration in the effort to develop a comprehensive post-Keynesian framework, particularly in that it helps to formalize the concept Keynes labelled as ‘animal spirits’ that exist in a context of the endogenous nature of macroeconomic fluctuations and non-linear, path dependent (non-ergodic) economic growth, and to justify the post-Keynesian divorce from rational expectations and the view that the economy is self-stabilizing at an optimal equilibrium.

Rosser Jr. (2006), an active proponent of the use of complex dynamics theory, argues that this conceptualization enriches post-Keynesian analysis of uncertainty as “complex dynamics provide an independent source of such fundamental uncertainty and uncertainty [...] can lead to speculative bubbles in asset markets [and] [...] financial fragility” (p. 77). In Rosser’s analysis, chaotic dynamics, a form of complex dynamics that is characterized by sensitive dependence on initial conditions (an idea originally proposed in the context of meteorological forecasting by Lorenz, 1972, who posed the curious question: “Does the flap of a butterfly’s wings in Brazil set off a tornado in Texas?”), holds significant implications for the characterization of the economy within the post-Keynesian framework. Specifically, “a small change in an initial condition or a parameter value can lead quite rapidly to substantially different behavior in a system, [and] this disrupts the learning mechanisms that underpin rational expectations” (p. 77). This characteristic underlies an economy’s non-ergodicity and the fundamental uncertainty that denies economic agents the possibility of accurately and confidently predicting future economic events in the process of economic decision making. The existence of multiple equilibria⁷⁵ and the inevitable existence of speculative dynamics (which are the result of individuals’ inability to know what other individuals, collectively, are thinking), are additional explanatory factors, and provide further considerations (and complications) for economic analysis.

⁷⁴ These ideas are developed into a comprehensive theory of ‘reflexivity’ by financial guru and self-proclaimed philosopher George Soros in a series of books and articles. See, for example, Soros (2009).

⁷⁵ See Rosser’s non-technical discussion of fractal basin boundaries (2006, p. 78), which help to explain the impossibility of rational expectations formation even in the absence of chaotic dynamics.

Numerous real-world examples of systemic non-ergodicity in economics have been proposed by researchers from various fields of economic and financial analysis. Durlauf (1993), boasting many contributions in the field of socioeconomic theory and the theory of economic growth, points out the existence of “sequential complementarities” created by “local linkages across industries [...] which build up over time to affect aggregate behavior [...] [and] can lead to aggregate growth”; he further highlights the importance of growth in leading sectors, connected to all other industries, which can have positive spillover effects that “lead the economy to sustained high production” (p. 350). These mechanisms are the inverse of hysteresis, irreversibility and the shock multiplier process, frequently stressed by post-Keynesian and institutionalist economists, who invoke the long-term, persistent negative effects on growth and employment of economic shocks that result in bankruptcy, destruction of production capacity and increasing debt overhand (Stiglitz & Greenwald, 2003, p. 300; Lavoie, 2004, p. 30; Palley, 2008, p. 6; Howitt, 2012, p. 20; see also an elaboration on this subject in section 5.2.2). In consideration of these factors, the post-Keynesian re-formulation of the neoclassical concept of the ‘natural’ rate of growth is thus framed in terms of an endogenously-determined ‘moving target’, which is the result of a path-dependent series of short-run outcomes (see further discussion in section 5.2.1). Lavoie (2004, p. 25) succinctly describes the sequence of dependencies that characterize the non-ergodic process that determines the rate of economic growth as follows:

Fast growth rates of demand imply fast growth rates of output; the latter encourages learning by doing but also a fast pace of capital accumulation, which on its own drives up the rate of technical progress; faster growth rates also encourage potential workers to enter the workforce, and they encourage foreign workers to immigrate to the area where growth proceeds at a faster pace, the two main components of the natural rate of growth, the growth rate of the labour force and the rate of technical progress, are thus positively linked to the rate of growth of demand.

Lavoie’s insightful analysis highlights the insufficiency of the neoclassical approach of the Federal Reserve to modelling workforce participation and technological progress as exogenous variables largely determined by a stochastic process, as these variables are integral determinants of future economic growth and are themselves endogenously determined by the current (and expected future) growth rates of the economy (which determine effective demand), in a circular flow of mutually-recursive elements. As we will see in the subsequent section, the implications of the above analysis for central bank policy making are significant

and call for a drastic shift in the framework within which the central bank formulates monetary policy.

2.6.2 CENTRAL BANK POLICY MAKING UNDER KEYNESIAN ONTOLOGICAL UNCERTAINTY AND SUBJECTIVE DECISION MAKING

The post-Keynesian view of the economy as a complex, dynamic, non-ergodic system characterized by decision making under radical uncertainty and frequently irrational and non-rational expectations holds important implications for the formulation of an appropriate and effective approach to central bank policy implementation.⁷⁶ A brief discussion of the precise nature of uncertainty, which significantly complicates the process of decision making of economic agents, is critical in that it possibly suggests an even more fundamental role of central bank expectations management than that prescribed by an analysis conducted in the framework of rational expectations and perfect information (see section 5.4).

Keynes's original characterization of uncertainty as ontological (or fundamental) rather than epistemic⁷⁷ describes a system where economic agents, aware of the limits of their knowledge, inherent decision-making ability, and the predictability of future economic events, adjust their behaviour accordingly (Keen, 2006, p. 44; Terzi, 2010, p. 562). Such behavioural adjustments are reflected in individuals' and firms' decisions on intertemporal budget allocation, particularly at times of increased economic or financial volatility, inducing increased savings over investment, the hoarding of liquidity or the allocation of a greater portion of the current budget to insurance against risks of unfavourable future events (see section 5.2.2).

Ontological uncertainty is thus one of the principle elements underlying money demand and provides the most valid explanation of the 'liquidity trap' that the Federal Reserve faced in its futile efforts to stimulate corporate investment and household consumption (see section 5.2.2). A useful framework for the analysis of such aggregate behaviour is provided by Arestis and Bittes Terra (2015), who describe three determinants of money demand, originally identified by Keynes, with only one, the 'transactions motive' related to the daily management of liquidity (generally conducted with a certain amount of

⁷⁶ The term 'irrational' implies a lack of logic given the information at hand, while 'non-rational' suggests an inability to arrive at a logical decision owing to lack of information or processing capacity. Reference to 'subjective' decision making aims to capture both of these elements.

⁷⁷ The concept of epistemic uncertainty, or incertitude, assumes economic agents that, in the 'perfect world' with no informational asymmetries, would make efficient, rational decisions, with imperfect information blamed exclusively for deviations from such results.

certainty and predictability), and the other two, the ‘precautionary motive’ and the ‘speculative motive’ related to the hedging against the uncertainty of future events and the trading of financial assets based on expectations of and speculation on the future, respectively (pp. 3-4).

The concept of liquidity preference, originally developed by Keynes and capitalized on by economists of various theoretical convictions from monetarists (Modigliani, 1977) to post-Keynesians (Arestis & Sawyer, 2004), provides a broader framework from which to analyse the relationship between money demand and monetary policy and, critically, suggests that the central bank has less effective control over the interest rate than mainstream theory supposes. The concept of liquidity preference seeks to capture the decision-making mechanism through which economic agents make the allocation amongst the various forms of assets, from liquidity (which includes money in its various forms, but can also include bonds that are deemed equal in their function to money) to less liquid and highly illiquid forms of investment assets such as equity, or illiquid/risky fixed income assets. Liquidity preference “can be considered a catch all for the state of financial market confidence and attitudes toward and assessment of risk” (Palley, 2008, p. 4), which is governed by the rather illusive and unquantifiable state of expectations, which as we argue are subjective, often unpredictable and frequently volatile. In turn, market confidence and attitude toward and perception of risk, closely interlinked with the aggregate state of expectations, are key to the determination of market interest rates, composed of the base rate plus a risk and liquidity premium; it is these interest rates, rather than the policy rate of interest, that are fundamental to economic activity, reflecting the conditions on which lending takes place, determining ability and, in some cases, desire to borrow, and establishing the distinction between profitable and unprofitable investment opportunities based on the required rate of return, calculated using a discount factor equal to the cost of borrowing, to name just a few channels of impact (see Chapters 3 and 4 for elaboration).

Given the potential critical disconnect between central bank policy and market rates of interest, determined largely by factors beyond the direct, mechanical control of central bank policy, an important consideration arises. Namely, success of monetary policy during the years of the Great Moderation was, at least to some degree, based on a fragile mechanism that the crisis of 2008 has seriously compromised. Specifically, capitalization on the faith of economic agents in the central bank’s ability to systematically (via the adjustment of monetary aggregates or the policy rate of interest) return the economy to a state of ‘potential’ output was a potent strategy of central bank policy during this era. The mechanism of ‘self-

fulfilling prophecy’ describes the process through which this faith translated into a general state of optimism, increased consumption, investment and, ultimately, a faster pace of economic growth. However, as confidence in the power of monetary policy begins to unwind (anecdotal evidence of this phenomenon is presented by Das, 2014, Schunknecht, 2015 and in section 4.6), the mechanism of self-fulfilling prophecy may begin to work in the opposite direction to the detriment of longer-term economic growth and prosperity (see section 5.2.2).

2.6.3 EXPECTATIONS MANAGEMENT IN EFFECTIVE MONETARY POLICY IMPLEMENTATION

Drawing definitive conclusions from the preceding discussion thus requires distinguishing between market expectations related to (1) the *nature* of monetary policy transmission, the *potency* of policy in general and the expected *effectiveness* of a specific policy implemented by the central bank, (2) the precise *stance* of monetary policy over a specific timeframe into the future, and (3) likely future economic developments in terms of the rate of economic growth, employment, price changes in the goods and asset markets, and so on (see section 5.4 for further elaboration on this subject).

Keeping in mind this fundamental distinction is critical to the task of evaluating the transmission mechanisms of monetary policy, as we will witness in the subsequent chapters, in a framework that places expectations management centre-stage as a critical policy aimed at maximizing the rate of employment and promoting maximum self-sustaining economic growth in the long run. The failure of expectations management policy under the NCM framework on point (1) can be ascribed to the erroneous focus on inflation as the central target of monetary policy, the incorrectly described transmission channels, based on the inappropriate three-equation NCM model of the economy (see Chapters 3 and 4), and the generally-exaggerated representation of the ability of monetary policy to ‘manage’ the economy in the short run, which proved inaccurate over the course of time. On point (2), commitment to low policy rates of interest created the corresponding expectations for the continuation of this policy, but failed in its intended effect on the economy owing to the discussed disconnect between the policy rate of interest and market rates, and owing to the inexistence of a presumed mechanism by which additional liquidity translates into additional lending; instead, expectations of continuing monetary policy stimulus turned ‘sticky’, forcing the central bank to maintain a low policy rate of interest and effectively removing the possibility of Fed-initiated rate rises without detrimental effects on market sentiment and economic activity.

An additional consideration arising out of the preceding analysis is related to the potential benefits of long-term interest rate stability, which would facilitate economic decision making and provide a long-term anchor to expectations,⁷⁸ at a rate that would be neither too low to promote speculation, create asset price bubbles, and mute the important market-driven mechanism of price discovery, nor too high to stifle economic growth, a scenario that holds significant implications for the endogenous long-term growth rate of the economy (this subject is elaborated on, producing specific policy prescriptions, in section 5.4). On (3), a comprehensive, new theoretical approach to understanding monetary policy transmission (Chapters 3 and 4) and the nature of underlying growth dynamics of the monetary production economy (see Chapter 5), as well as, eventually, a new modelling approach, reflective of this more realistic and effective theoretical framework, would provide appropriate policy forecast, promoting faith in the ability of the monetary authorities to achieve their targets and providing an environment of stability and confidence conducive to investment that is so fundamental to economic growth.

2.6.4 ON THE IMPORTANCE OF LIQUIDITY, INFORMATIONAL FRICTIONS AND INSTITUTIONS

We have thus far sketched a heterodox theoretical paradigm characterized by ontological uncertainty, complex dynamics and subjective decision making, in which economic growth is endogenous and non-ergodic, subject to multiple possible states of equilibria or long-term disequilibrium, and where money is endogenously created by banks via the issuance of credit. For our purposes, this framework is not complete, however, without at least a brief consideration of the financial sector, developed further in Chapter 4, and the related issues of liquidity and informational frictions, which arise in spite of the significant progress in and sophistication of modern information technology. The key responsibility of the Federal Reserve in its day-to-day accommodative role of liquidity provider (see section 2.3) has been greatly complicated in recent decades by the evolution and expansion of the financial sector, a process sometimes referred to as the ‘financialization’ of the economy (see section 5.2.3 for an elaboration). In fact, even the concept of ‘liquidity’ itself has become somewhat illusive, given the lack of a clear distinction between money and assets (see section 1.10), the importance of global, rather than predominantly domestic, liquidity (Eickmeier et al., 2013), and the role of collateralization and securitization in the creation of crucial, albeit temporary,

⁷⁸ For an interesting elaboration on the importance of interest rate stability in the context of expectations formation and Keynes’s theory of liquidity preference, see Kregel (2014c).

liquidity (Albertazzi et al., 2011; Singh, 2012; Singh & Stella, 2012; Dianova 2015a), to name just a few pivotal considerations.

Evaluating the success of central bank policies aimed at easing liquidity conditions (as was the case of the entire set of post-crisis initiatives of the Federal Reserve, listed in Table 1 of the Appendix) therefore involves a consideration not just of reserves as the ultimate form of liquidity for banks, but of the effects of such policies on highly liquid assets, such as government bonds, which are equivalent in their function to the former. For example, policies aiming to increase liquidity via the substitution of government bonds for reserves may not only be ineffective but may actually be contractionary, in that such policies increase the scarcity of interest-bearing assets used by the banking sector for critical liquidity operations and transactions (Williamson, 2011, p. 46). On the other hand, permanent liquidity must be distinguished from temporary liquidity in policy implementation, as conditions in the financial sector may rapidly reverse during times of strain, with the evaporation of the liquidity of particular assets, prompting the shortening of collateral chains. In addition, the importance of differentiating between illiquid and insolvent entities implies the need for increased regulatory penetration as a prerequisite to effective implementation of monetary policy.

Our previous discussion of the role of expectations in economic decision making and the consequent limits to the power of monetary policy to stimulate lending via the provision of liquidity further complicates the issue, suggesting the need for a greater temporal dimension to liquidity provision and an increased emphasis on expectations management in this regard. Finally, implications of considerable amounts of liquidity being held outside of the core banking sector by shadow banks and non-bank entities highlighted by Singh and Stella (2012, p. 11) is clearly an important consideration, but remains largely unexplored in the context of monetary policy transmission.

The aforementioned issues highlight the importance of informational imperfections, or frictions, that characterize financial decision making and which persist in spite of the rapid pace of technological progress that has made available previously unimaginable computational power, scope and speed, allowing for an instantaneous exchange of information globally. The nature of this issue is multidimensional. In part, it relates to the inherent complexity of individual decision making captured by the concept of speculative dynamics and irrational or non-rational expectations discussed above, implying significant limits on the ability of monetary policy to mechanically achieve specific goals via well-defined policy implementation. Equally important is the fact that information frictions arise

as a result of the ever more complex institutional structure of the modern financial sector, characterized by the increasingly significant presence of shadow banks and non-banks, unregulated financial market players, complex financial products designed to spread risk, which, however, feature the inevitable drawback of informational obscurity, and cryptic corporate structures that allow for an effective masking of risk via off-balance sheet accounting (see footnotes 132 and 133 for sources on these subjects).

Additionally, institutional economics theory, most notably represented by Joseph Stiglitz, who won a Nobel Prize for his work on asymmetric information, highlights the importance of heterogeneity of credit, the costs of obtaining, and the fragility of, information related to the creditworthiness of borrowers, and the resulting credit rationing, all of which may create an impediment to the process of endogenous money creation by the banking sector (Stiglitz & Greenwald, 2003, pp. 26-27) during times of financial tension, particularly in the run-up to and for a period after a financial crisis. While incorporating these factors into a structured analysis of monetary policy transmission channels greatly complicates the task, as we will see in Chapters 3-5, an analysis that abstracts entirely from these considerations is clearly incomplete and inadequate.

The results of the hitherto analysis of the theory of central banking thus provide a framework that contrasts starkly with the neoclassical paradigm, which assumes rational expectations, perfect information and efficient capital markets, and a monetary policy framework that can be neatly described by a linear, deterministic three-equation model of the economy. Instead, we conduct our evaluation of the effectiveness of monetary policy in promoting maximum sustainable rates of economic growth in both the short and the long run, on the assumption of an endogenous, path-determined, non-ergodic natural rate of economic growth that is characterized by sensitivity to initial conditions and is the result of a continuous sequence of short-run outcomes, in a downturn subject to hysteresis and irreversibility, and in an upswing subject to sequential complementarities and positive spillover effects. In the long run, the fluctuation of the natural rate of growth may thus occur around multiple possible equilibria, while the negative scenario of long-term disequilibrium characterized by high rates of unemployment or a low rate of workforce participation is an unfortunate possibility.

In this context, conclusions on the role of the central bank and the importance of monetary policy are somewhat paradoxical. On the one hand, the adoption of the aforementioned theoretical assumptions points to a significant role of monetary policy in determining not just the pace and sustainability (that is, long-term continuity and viability) of

economic growth at the present point in time, but more important, the trajectory along which economic growth will move in the future; this, precisely, is the essence of the non-neutrality of monetary policy. On the other hand, the adopted paradigm strips monetary policy of the theoretically elegant, precise and mathematically coherent mechanisms through which it is presumed to determine short-term economic activity under neoclassical theory, replacing the precise goal of inflation stabilization assigned to it under NCM with a more elusive, though indisputably more noble, goal of promoting economic growth and maximum rates of employment.

In analysing the transmission channels of monetary policy in Chapters 3 and 4, we thus adopt an alternative, heterodox theoretical framework, which describes the economy as a complex, dynamic, non-ergodic system characterized by decision making under radical uncertainty, asymmetric information, and frequently irrational and non-rational expectations, and which underscores the importance of a number of dynamics in the financial sector to growth in the production economy, thus underscoring the inherent role of the complex institutional structure in determining the transmission and effectiveness of the central bank's monetary policy.

3 MONETARY POLICY TRANSMISSION: INTEREST RATE AND BALANCE SHEET CHANNELS

“If a gun is extremely imprecise and erratic, it may be best not to fire it at all.”
(Hannsgen, 2004, p. 23)

The decade which followed the collapse of Lehman Brothers and the start of the Great Recession in the United States has provided monetary economists with a rich, real-world laboratory for elaborating their understanding of the mechanisms and the effectiveness of monetary policy in achieving a number of fundamental objectives. While much progress has been made in both theoretical and empirical research in this field, the question of whether monetary policy, with its expanded and adapted policy kit, is able to make a significant impact on the pace of recovery in economic activity remains unanswered. One assertion which is largely uncontested is that, nearly one decade since the start of the crisis, the US economic performance is lacklustre or, in the words of former Fed Chairman Ben Bernanke (2013, p. 8) “sluggish” at best, in spite of extraordinary efforts by the Federal Reserve to stimulate economic recovery and boost economic growth.⁷⁹ Exhibit 3, which shows the pre-2008 crisis trend growth of real GDP versus the actual growth in real GDP of the US economy, provides a clear illustration of loss in economic output that the economy has suffered as a result of the crisis.

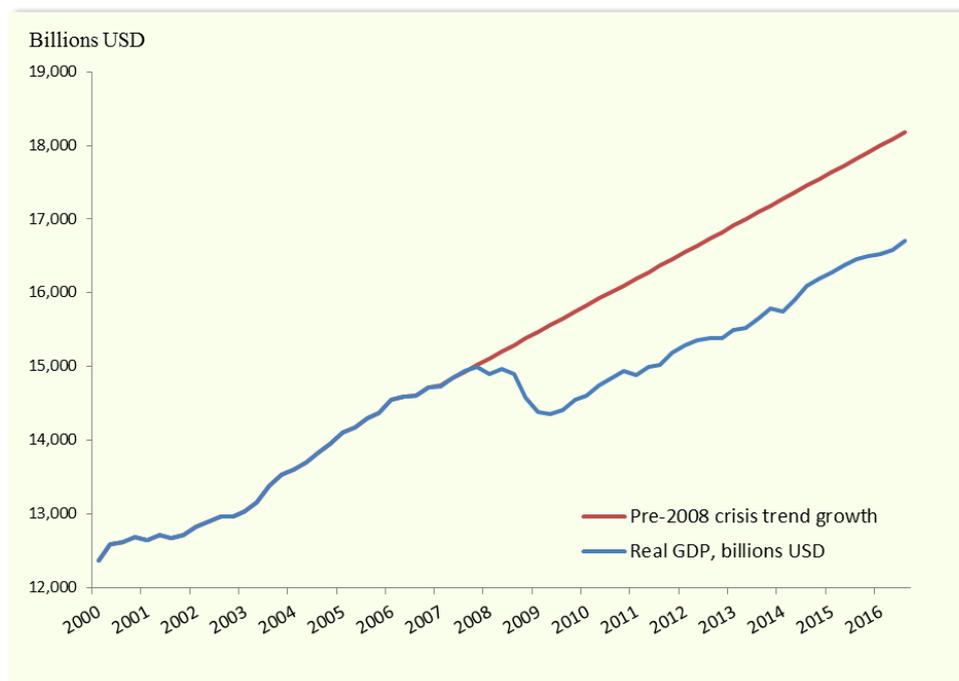
Empirical evidence offers support for the weakness of the recovery in the labour market, whereby the US economy is characterized by significant structural unemployment, with at least 1.2 million Americans unable to find work owing to a permanent shift in the structure of the US economy resulting from the crisis (Chinn et al., 2014, p. 119). Further, survey evidence suggests that official employment data understates the true state of matters, as many discouraged job seekers have left the labour market and others have settled for poorly-paid part time jobs (DiMartino Booth, 2016). In fact, an alternative measure of unemployment, provided by Williams (2017), which, in contrast to the official U-3 measure calculated by the Bureau of Labor Statistics, includes discouraged workers who have not actively sought work for over four weeks (automatically excluded from the U-3 survey base), suggests a shockingly high level of unemployment. While the official U-3 rate of

⁷⁹ The Fed’s post-crisis efforts have been extraordinary in both the unprecedented extent of balance sheet expansion (Borio & Disyatat, 2009, p. 6), as well as in scope, which refers to the innovative use of existing facilities as well as the initiation of new facilities and communication methods, as described in sections 2.3 and 2.4. See Exhibit 1 for a graphical representation of the evolution of the Fed’s balance sheet.

unemployment for May 2017 is 4.1 percent (Bureau of Labor Statistics, 2017), the alternative figure indicates unemployment in the same period of 22 percent (Williams, 2017).

As we will see, these findings are explicable and unsurprising when examined within the theoretical framework proposed in Chapter 2, which argues for a view of economic growth as endogenous, path determined (non-ergodic), hysteresis-augmented and subject to multiple possible employment equilibria (see section 2.6.1). They also raise the question of whether the effects of the Fed’s monetary policy have gone significantly beyond the financial sector to impact the dynamics of the production economy and hence output and employment in a meaningful way.

Exhibit 3 Pre-crisis trend growth vs. actual growth, US real GDP, 2000-2016



Source: Author’s elaboration of Bureau of Economic Analysis data (quarterly real gross domestic product, seasonally adjusted annual rates series) and author’s own calculations.

In this chapter we extend the theoretical investigation undertaken in Chapter 2 to a comprehensive analysis of the theoretical transmission channels of US monetary policy in the post-crisis period,⁸⁰ a task we continue in the subsequent chapter. The goal of this analysis is

⁸⁰ As stated previously, we avoid discussion of the immediate effects of the financial crisis or the central bank in its role of lender of last resort, focusing instead on the post-crisis period after the critical liquidity shortages had been resolved and financial stability re-established. Furthermore, we exclude consideration of the exchange

to enhance our understanding of whether monetary policy, via definitive and definable transmission channels, is able to stimulate consumption and investment and thus the endogenously-determined rate of economic growth in a post-financial-crisis era. We allow the alternative monetary policy objective (developed within a post-Keynesian analytical framework in section 2.2.2), which places current GDP growth rates and the level of employment centre stage in the design and implementation of policy, to frame the discussion.

This work makes a number of important contributions to the existing literature. First, a clear and systematic analysis of the theoretical transmission channels of monetary policy is in itself an important undertaking, as there appears to be significant confusion in the existing literature in terms of the mechanisms of the various channels, the related terminology and the theoretical framework on which each is based. Second, the use of the post-Keynesian theoretical framework set out in Chapter 2 makes the following analysis a crucial contribution to the body of heterodox economics literature on this subject, which has been recognized to be particularly thin owing to the “difficulty in specifying the relevant mechanisms [of monetary policy transmission]” in a non-neoclassical framework (Boivin et al., 2010, p. 55). We further amplify the scope of the discussion by considering the effectiveness of the Fed’s policy implementation in delivering the desired stimulus via the active transmission channels to the production economy and the side-effects (costs) that the use of this strategy entails. Finally, we offer a review of the empirical evidence on each of the transmission channels found to be theoretically robust and practically actionable. The findings of the comprehensive research effort presented in Chapters 3 and 4 suggest that monetary policy is ineffective in its goal of stimulating consumption and investment, with policy transmitted via a number of active transmission channels which deliver imprecise, unpredictable and at times diverging stimuli to the economy during the period of post-crisis recession, and that the Federal Reserve’s policies affect predominantly the financial markets, with little systematic transmission to the production economy. The mixed, and frequently contradictory, results of empirical research published in recent years speak in support of the conclusions of this theoretical analysis.

The remainder of this chapter discusses two groups of monetary policy transmission channels, namely, interest rate channels and balance sheet channels, both of which

rate channel of monetary policy for two reasons: first, we wish to limit the scope of this already daunting subject area and second, while this channel is of fundamental importance for small open economies, it is much less important for the United States, for which the net effects of imports and exports on aggregate demand are believed to be close to zero (Boivin et al., 2010, p. 23).

theoretically transmit monetary policy stimulus via the household and corporate sectors to consumption and investment, two important components of aggregate demand. Discussion of transmission channels which theoretically impact aggregate demand via the financial sector is relegated to the subsequent chapter.

3.1 INTEREST RATE CHANNELS

We begin our analysis of monetary policy transmission by examining a group of channels which can be jointly referred to as interest rate channels, and which encompass all effects of changes in the policy rate of interest on the demand for, the cost and the flow of credit to the corporate and household sectors, as well as on these sectors' investment and consumption decision making. This group of channels has received the greatest emphasis in the neoclassical framework of monetary policy, and was traditionally viewed as the centrepiece of the transmission mechanism of monetary policy to the economy. One important flaw of the traditional formulations of interest rate channels is that they begin with a presumption that monetary policy impacts output in a direct manner, a theoretical assumption that is formally represented by the aggregate demand equation discussed (and criticized) previously (see section 2.5.1), and this first-order effect on output is then believed to be propagated within the economy via several channels.

A heterodox interpretation of monetary policy transmission necessitates taking one step back to examine the initial link between changes in the policy rate of interest, which has been at (unusual in recent history) near-zero rates since the crisis (see Exhibit 4), and the first-order effects on the economy, eliminating reference to a 'monetary tightening' or a 'monetary expansion', which suggest that a change in the stance of policy necessarily leads to a one-directional change in aggregate demand. We thus proceed with a theoretical analysis, supported by empirical evidence, of the interest rates channels, beginning with an examination of a number of corporate investment channels followed by a consideration of three possible household consumption channels.

3.1.1 CORPORATE INVESTMENT CHANNELS

(1) *Corporate fixed capital investment*

Theory on the *corporate fixed capital investment* channel in its traditional neoclassical formulation posits that the central bank's increase of the money supply results in a fall in real

interest rates, a lower cost of capital and a subsequent rise in corporate investment, which in turn leads to an increase in aggregate demand and output (Mishkin, 1996, p. 2). Neoclassical research on this channel has emphasized the relative importance of real long-term, rather than short-term, interest rates for investment decision making, which necessitated the elaboration of a mechanism to link the central bank's manoeuvring of the short-term nominal rate to changes in the long-term real rates of interest. This was achieved in neoclassical models via the introduction of sticky prices, which allowed for a simultaneous move of the nominal and the real short-term interest rate, while the expectations hypothesis was used to explain the presumed subsequent transmission of this change in short-term rates to the long end of the yield curve.

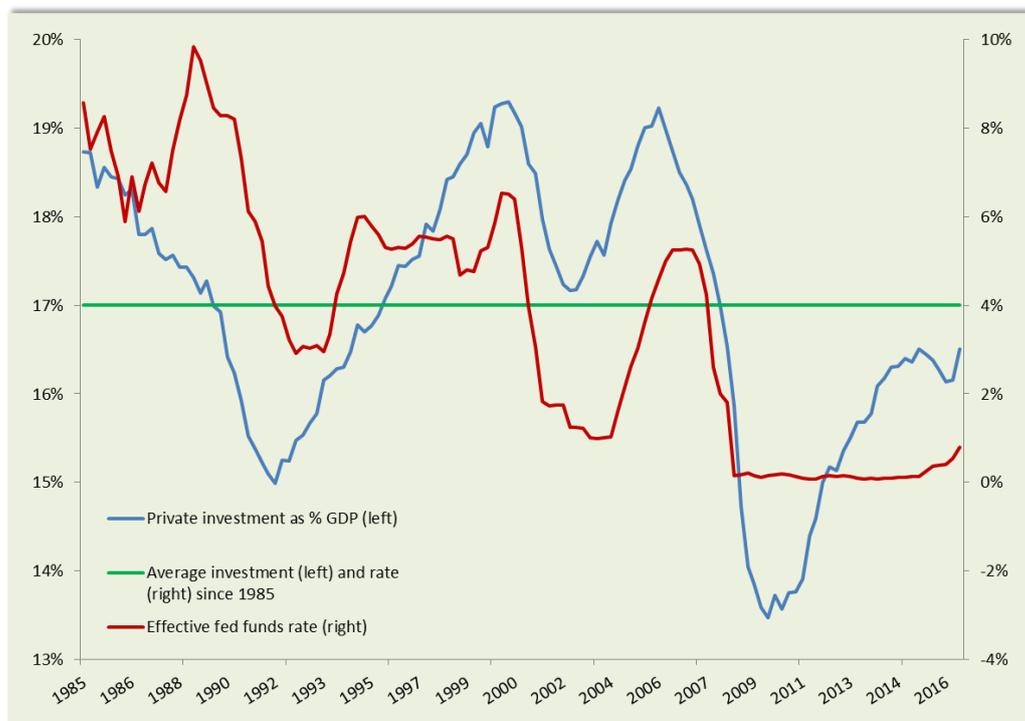
Recent research developments in the area of monetary and interest rate theory have exposed the weakness of the assumptions underlying this formulation of monetary policy transmission. While the erroneous assumption that the central bank controls the money supply can be circumvented by assuming, more appropriately, that the change in the nominal interest rate occurs directly via a change in the federal funds rate, other assumptions do not lend themselves to simple reformulation. First, at the lower bound of zero, where monetary policy frequently stalls during periods of prolonged recession, no further downward interest rate moves are possible without the application of negative interest rate policy (which the Fed has thus far avoided),⁸¹ and under the even more complex scenario of stagflation, the existence of price stickiness would result in an increasing cost of capital and, theoretically, in a fall in corporate investment. The more baseline assumptions implicit in this theoretical model of monetary policy transmission involve static or extrapolative expectations in capital investment decision making by firms (Chirinko, 1993, p. 1880), entirely neglecting the uncertainty of future economic developments, the subjectivity of corporate decision making and the instability of economic forecasting facing corporate decision makers, as well as the irrationality that is an inescapable characteristic of even the most structured and disciplined corporate minds (see sections 2.5.3 and 2.6.2).

Furthermore, empirical evidence on the subject suggests that output has a far greater impact on corporate investment than cost factors (*ibid.*, p. 1881), a phenomenon predicted by Keynes's theory of the importance of effective demand for investment (see section 1.3) and the framework of investment decision making under ontological uncertainty (see section 2.6.2). Thus, unless a period of post-crisis recession were characterized by expectations of a

⁸¹ We critically analyse the policy of negative interest rates in section 4.4.

strong economic recovery or otherwise irrational corporate exuberance, it is difficult to find an impetus for increasing corporate investment in the context of low or decreasing policy rates of interest. Finally, recent empirical evidence on post-crisis interest sensitivity of investment plans based on survey data of a variety of US firms suggests that firms are generally interest insensitive in their investment decisions (Sharpe & Suarez, 2014; Kothari et al., 2014), further discrediting the theoretical transmission channel under examination. As we see in Exhibit 4, in fact, private business investment has been positively, rather than negatively, correlated with the policy rate of interest in the past three decades, and business investment since the crisis has remained at well below the historical average, in spite of an effective fed funds rate at unprecedented low levels for the period considered. In fact, Exhibit 4 shows that just as the effective fed funds rate plunged below its 30-year average of four percent to around zero percent between 2007 and 2008, private investment as a percentage of GDP fell below its historical average of 17 percent, hitting a low of 13 percent in 2010 and remaining below the 17 percent average to the present time.

Exhibit 4 Private business investment as percent of GDP and effective fed funds rate, 1985 – 2016.



Source: Author's elaboration on Federal Reserve Bank of St. Louis *FRED* data (effective federal funds rate), and Bureau of Economic Analysis data (Table 5.3.5. private fixed investment and Table 1.1.5. gross domestic product) and author's own calculations.

The presumed transmission of the central bank's downward pressure on short-term interest rates to real long-term interest rates also lacks a theoretical and empirical basis. First, empirical evidence has shown that long-term rates are poor predictors of future realized spot rates (Guidolin & Thornton, 2008; Carpenter & Demiralp, 2011; Thornton, 2014, p. 211),⁸² which suggests that there is little information in the yield curve on the actual future path of real rates – the relevant decision-making parameter for corporate investment in this context. Setting aside the theoretical complications of decision making under ontological uncertainty (see section 2.6.2) and assuming that firms and corporations base their investment decisions predominantly on current estimates of future interest rates, a rise in the risk (term and liquidity) premium, based on the financial market's negative view of future economic prospects, may result in an upward move of expected real long-term interest rates in spite of a downward movement in the policy rate of interest.⁸³ This undermines one of the main assumptions implicit in the corporate fixed capital investment channel, namely the link between the central bank's lowering of the short-term nominal interest rate and the downward movement of long-term real interest rates. While a number of other criticisms may be mounted against the theoretical basis of the corporate fixed capital investment channel, the previous analysis exposed a sufficient number of weaknesses to allow us to cast aside this neoclassical formulation of monetary policy transmission, which fails to convincingly represent a realistic causal relationship between a change in the interest rate and aggregate demand.

(2) *Inflation expectations and corporate investment*

The *inflation expectations and corporate investment* channel of monetary policy transmission has been developed alongside the *corporate fixed capital investment* channel discussed above and offers an alternative neoclassical perspective on how monetary policy may impact corporate spending, as well as an elaboration on how central bank actions may impact long-term real interest rates even when interest rate policy is constrained by the zero lower bound, as in the post-2008 crisis decade. In the traditional formulation of this channel, a central bank's expansion of the money supply results in an increase in expected inflation, which

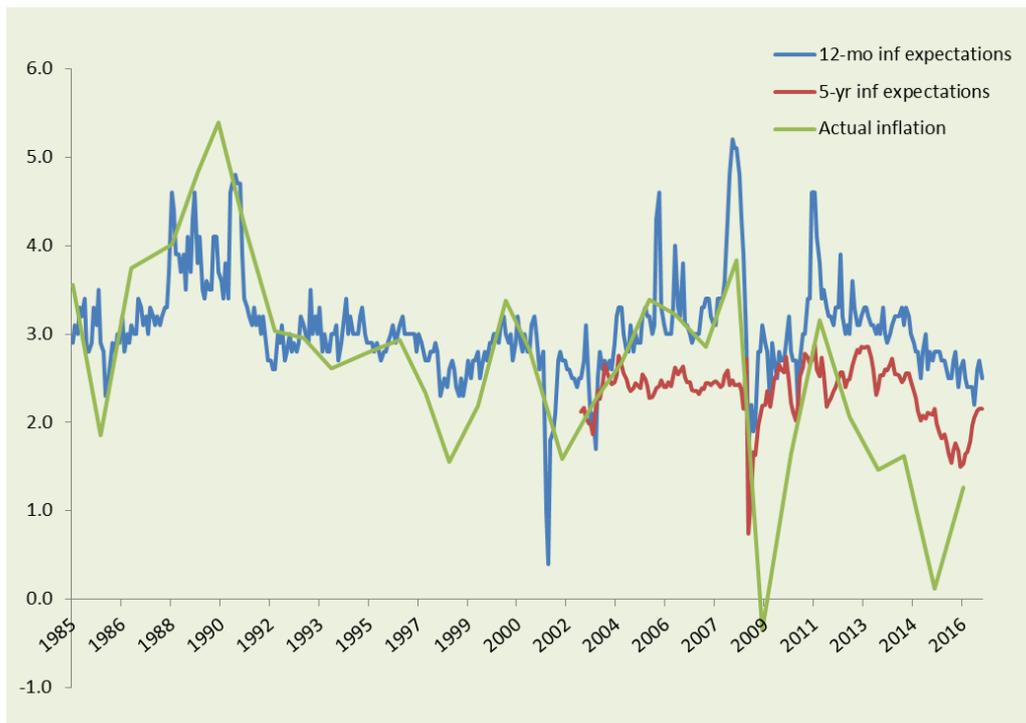
⁸² For further empirical evidence rejecting the expectations hypothesis see Campbell and Shiller (1989), Bekaert et al. (1997), Cochrane and Piazzesi (2005).

⁸³ For empirical evidence on the disconnect between the federal funds rate and long-term Treasury rates see Thornton (2014, p. 211).

lowers the real interest rate and increases corporate investment via the same mechanism as in point (1) above (Mishkin, 1996, p. 3). Acceptance of the central bank's inability to control the money supply and the view that recent changes in the functioning of the financial sector resulted in a change in monetary policy transmission mechanisms have led neoclassical economists, including Mishkin, to propose alternative formulations of this channel in recent literature. Boivin et al. (2010) re-examine the expectations and corporate investment channel, modelling a central bank that controls only the short-term interest rate, but maintaining the view that nominal wage and price rigidities result in a direct link between the nominal and real interest rates (p. 5), that the link between short- and long-term interest rates is justified by the expectations hypothesis (p. 9), and that the expected real rate of appreciation of capital assets, an important determinant of investment spending, is determined by expectations of future inflation.

The weaknesses of the former two assumptions have been highlighted in the previous section, while the neoclassical perspective on inflation has been discussed in detail in section 1.13, highlighting the theoretical disconnect between interest rate policy and realized inflation, as well as the empirical irregularity of the neoclassical view in the context of the post-crisis period characterized by significant monetary policy stimulus and persistently low rates of inflation. Considering Exhibit 5, which illustrates the historical trend of actual inflation as well as 12-month and 5-year inflation expectations, we notice the slight downward bias of all three variables since the peak of inflation around 1990. Furthermore, the chart illustrates the absolute absence of persistent expectations of rising inflation over the 5-year horizon, including and particularly during the period immediately following the 2008 crisis and the beginning of large-scale central bank intervention, quite contrary to what one would expect to witness during a time of significant monetary 'expansion' within the mainstream theoretical framework on which the *inflation expectations and corporate investment* channel is based.

We can therefore conclude with confidence that, while the role of expectations is undoubtedly critical for the transmission of monetary policy, the *expectations and corporate investment* channel appears a theoretically unlikely representation of how monetary policy's impact on expectations feeds through to the production economy. In fact, while maintaining the theoretical validity of this channel, Boivin et al. (2010) conclude that, based on existing empirical evidence, the influence of monetary policy on investment via this channel is likely to be minimal (p. 11).

Exhibit 5 Inflation expectations and current inflation, 1985-2016.

Source: Author's elaboration of Federal Reserve Bank of St. Louis, *FRED Economic Data*.

Term premium and corporate borrowing

As we have seen thus far, the neoclassical version of the hypothesis that monetary policy impacts the economy by affecting interest sensitive components of aggregate spending (focusing hitherto on corporate investment) is theoretically weak and has received little empirical support. A more plausible articulation of the interest rate channel to examine is that of the effects of the external finance premium (the difference between the costs of internally and externally raised funds, to wit, retained earnings versus equity or debt). Initial sketches of this channel appeared in Bernanke and Gertler's 1995 proposal of a credit channel. One of the novel strands of research in this area has focused on elaborating these ideas in the context of recent changes in the financial architecture and the evolution of the Federal Reserve's strategy in the post-crisis period, focusing on developing a new rendition of the interest rate channel which aims to break down the effects of the Federal Reserve's large-scale asset purchases (LSAPs)⁸⁴ on the Treasury yield curve and the consequent impact on corporate investment decision making. In this context, two distinct sub-channels have been proposed,

⁸⁴ See the discussion of the Federal Reserve's balance sheet policies (quasi-debt management and credit policies) in section 2.4.

namely, the *duration channel* and the *local supply channel*. Understanding the distinction between these two sub-channels involves decomposing the Treasury yield into its various components; specifically, the m maturity Treasury yield comprises the risk-free rate (RFR), expected inflation and the risk premium, the latter of which is in turn composed of an m maturity-specific market term premium and an idiosyncratic instrument-specific term premium:⁸⁵

$$\mathbf{yield}_m = \text{RFR}_m + \text{expected inflation} + \text{risk premium}_m$$

$$\mathbf{risk\ premium}_m = \text{market term premium}_m + \text{instrument-specific term premium}$$

(3) *Duration channel*

The first of the sub-channels, the *duration channel*, deals with the effects of LSAPs on the maturity-specific market term premium portion of the risk premium. As the central bank purchases large quantities of assets in the market, it assumes duration risk on its portfolio thus lowering the maturity-specific market term premium portion of the risk premium and consequently the total maturity-specific risk premium (represented by a flattening of the yield curve) across a large portion of the asset market (Bauer & Rudebusch, 2013, pp. 6-7; Reza et al., 2015, p. 3). The duration channel presumes the existence of a significant number of maturity-indifferent financial market players, which allows for the reduction in the risk premium to be spread across a large number of assets beyond those purchased by the central bank (Gagnon et al., 2010, p. 2; Poloz, 2015, p. 5), affecting a wide spectrum of borrowers and thus increasing borrowing, spending and investment, including corporate investment.

(4) *Local supply channel*

The *local supply channel* offers an alternative theoretical formulation of the above based on a competing theory of maturity preference. This version of monetary policy transmission deals with the effects of LSAPs on the idiosyncratic, instrument-specific term premium portion of the total risk premium, and is an endorsement of the preferred habitat theory of maturity preference. In this conceptualization, significant market segmentation is presumed to exist, whereby holders of assets have strong preferences for specific maturities or for assets with similar risk characteristics (a theory supported by empirical research such as D'Amico &

⁸⁵ The instrument-specific term premium reflects excess demand or supply for a specific security (Bauer & Rudebusch, 2013, p. 6).

King, 2012), and central bank purchases of assets affect the instrument specific, rather than the market, term premium (Bauer & Rudebusch, 2013; pp. 5-6 and Bernanke, 2013, p. 7).

These two formulations of the interest rate channel allow for a circumvention of the critique, applicable to the traditional neoclassical versions of this channel which focus on the effects of changes to the risk-free rate, that market interest rates do not always move in the same direction as the policy rate of interest (see section 2.5.3) and also deal effectively with the problem of the zero lower bound of interest rate policy. However, this theory of transmission suffers from a number of important set-backs. First, much of the theoretical and empirical research on this channel has focused on examining the link between asset purchases and resulting changes in the yield curve, while less attention has been devoted to the analysis of whether changes in the yield curve actually impact corporate investment in a significant manner. The theoretical dissection of the transmission of changes in the yield curve to aggregate demand appears limited to the presumption that lower term premia encourage borrowing and thus investment amongst corporations (as the external finance premium, that is, the difference between the cost of internal and external funds, shrinks). Before examining the empirical evidence on the effectiveness of this channel, we consider a number of theoretical weaknesses of this assumption.

To begin with, contrary to the precision with which the theoretical dissection of the yield is presented in mathematical notation (Kim & Orphanides, 2007, p. 29), even relatively precise estimates of the actual term premium are impossible to obtain, with various empirical and survey-based methods leading to a wide range of estimates, “while questions regarding their reliability and seemingly excessive variability often limit their appeal to practitioners” (*ibid.*, p. 38). In fact, during recessions and periods of financial instability, the term premium may actually turn negative, reflecting investors’ willingness to accept a lower yield in order to secure a fixed rate of return for a given period of time, thus limiting reinvestment risk (particularly characteristic of interest income sensitive investors, such as pension funds). This phenomenon is estimated to have occurred on a number of occasions since the start of the financial crisis in 2008 in the United States, with the official Fed estimates of the 10-year term premium remaining below zero through much of the period from December 2014 through 2016 (Federal Bank of New York, 2016).

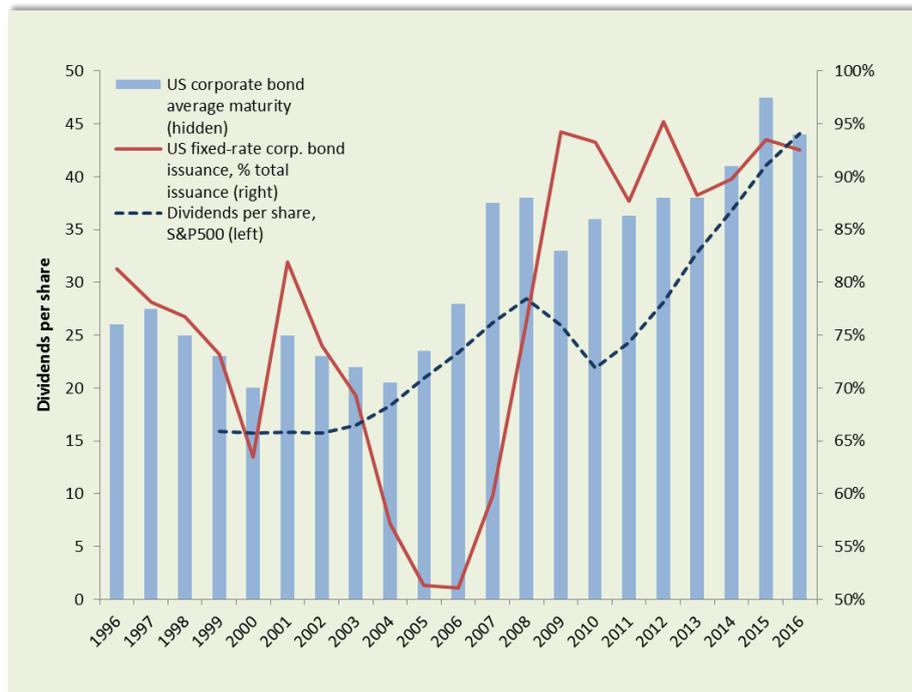
In this context, it is unclear how central bank efforts to further suppress the term premia on Treasury securities would have a positive impact on corporate borrowing and investment. In particular, negative term premia may be illustrative of a supply shortage of long-term safe-haven investments, which further central bank purchases would aggravate, the

result of which may be a negative impact on aggregate demand via the income channel described in Chapter 4. Furthermore, if the downward pressure on term premia of Treasury yields is due to the ‘safe haven’ demand for long-term Treasury securities (Bernanke, 2013, p. 6), it is unlikely that such a reduction in the term premia of Treasury securities would be transferred to the yield curve of inherently riskier corporate bonds.

Casting aside, momentarily, the above criticism and assuming that LSAPs successfully reduce term premia relevant for debt issuing corporations, it is still necessary to theoretically justify the assumption that such a reduction results in an increase in corporate borrowing for investment purposes. Alternatively, firms may undertake debt maturity restructuring, issuing cheaper long-term debt for the purpose of retiring relatively more expensive short-term obligations. Evidence of the importance of supply-side factors in public debt markets for the corporate choice of debt maturity structure is provided by Custodio et al. (2013, pp. 211-212), while a novel theoretical exposition of the theory of firms’ active debt market timing, whereby firms take advantage of shifts in the yield curve to issue debt at the cheapest maturity, is provided by Greenwood et al. (2010). Even in the absence of debt restructuring, firms may use newly-generated liquidity for other purposes. Stein (2012) argues that although low interest rates have encouraged corporate borrowing, both amongst high-grade and speculative-grade issuers, two-thirds of the proceeds have been used for refinancing, deleveraging, dividends and share buybacks. He concludes that “[s]uch patterns are what one would expect in a world of segmented markets and negative term premiums” (p. 9), in line with what we have argued previously.

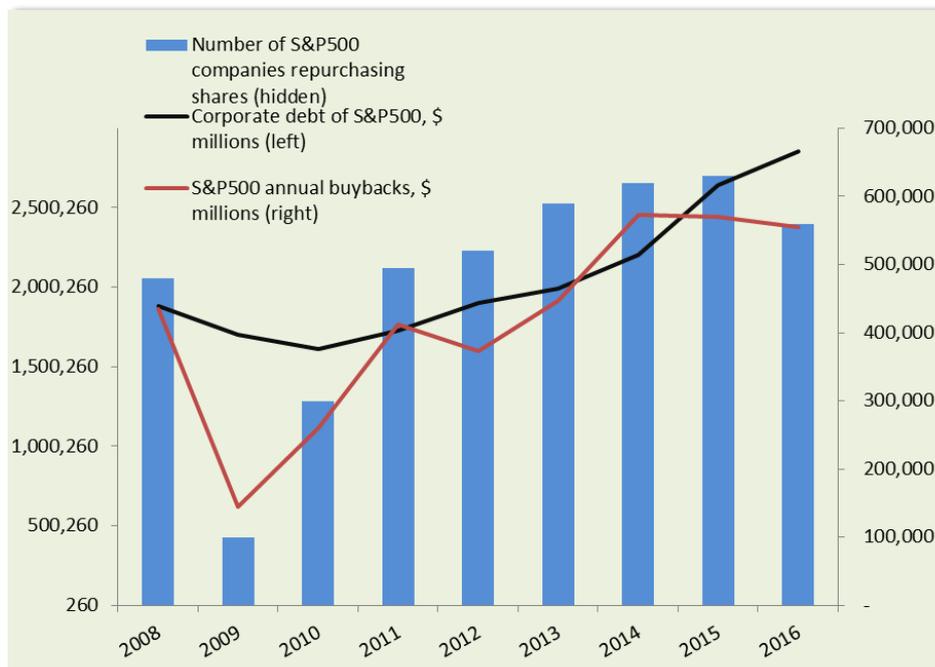
A glance at the empirical trends in corporate borrowing and distribution confirms the above hypotheses and Stein’s findings. Exhibit 6 illustrates the rising maturity of corporate debt, considering the period 1996-2016, which from a low of 7.2 years in 2000 has risen to a peak duration of 17 years in 2015 (Sfima, 2017). Firms have also taken advantage of low interest rates to lock in the rates of their long-term debt, increasing the portion of fixed rate to total bonds, which in 2016 made up 93 percent of corporate debt stock (*ibid*). Finally, the graph illustrates the drastic increase in dividend pay-outs amongst the S&P500 companies (excluding financials) since 1999, which have risen from approximately \$16 per share in 1999 to nearly \$45 per share at the end of 2016 (FactSet, 2017). Zooming in on the period following the financial crisis, Exhibit 7 illustrates the significant rise in the number of S&P500 companies engaging in share repurchases in the seven years after the crisis, as well as in the total dollar amount of share repurchases by non-financial companies of the S&P500 index over the same period.

Exhibit 6 Corporate debt maturity, share of fixed-rate debt and dividend pay-outs, 1996-2016.



Source: Author’s elaboration on Sfima data (US corporate bond average maturity in years; US investment grade and high yield corporate non-convertible callable and non-callable bond issuance) and FactSet (trailing 12-months dividends per share of the S&P500, excluding financials).

Exhibit 7 Corporate buybacks and accumulation of debt, 2008-2016.



Source: Author’s elaboration on FactSet data (S&P500 excluding financials quarterly buybacks, number of S&P500 companies repurchasing shares and net nonfinancial corporate debt).

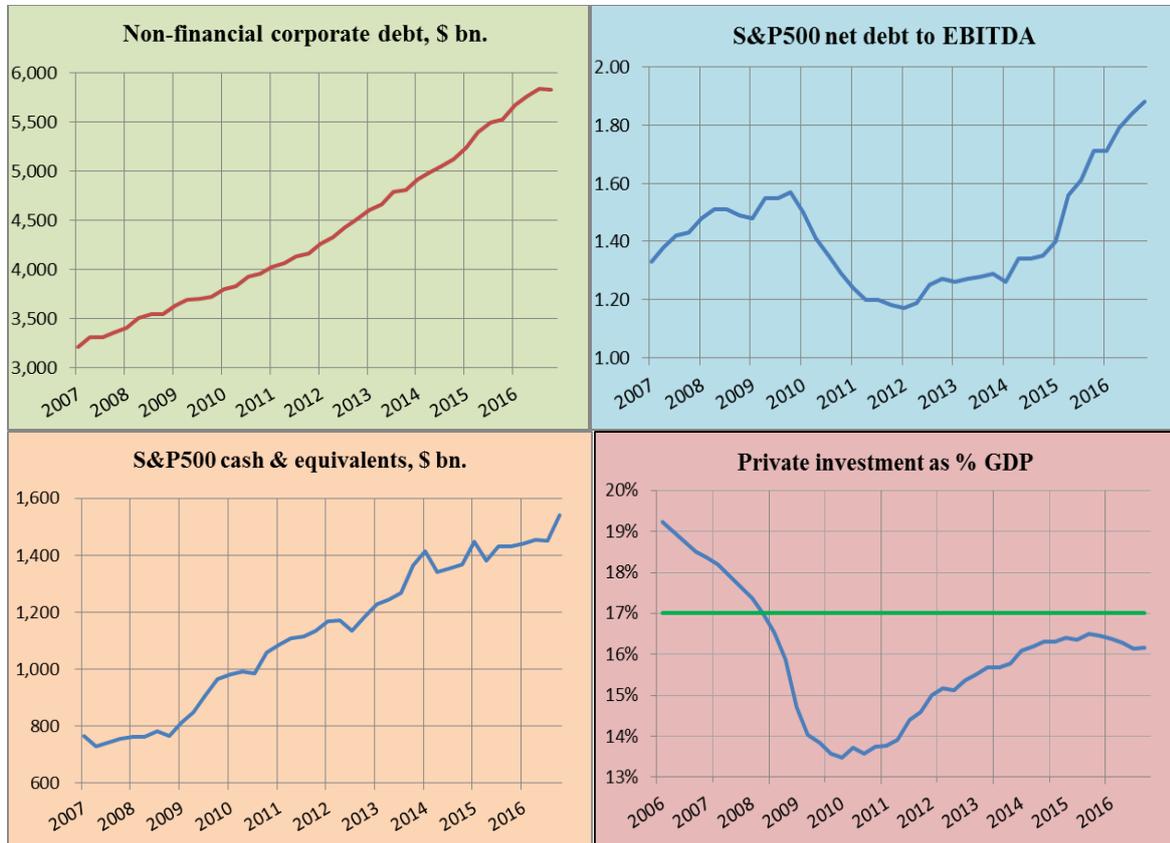
The trend in corporate debt, which theory and the aforementioned empirical evidence suggest, is also presented in Exhibit 7, and shows the persistent and significant increase in leverage, represented by the black line, which has supported the generous redistribution policies of the corporate sector since 2008.

Yet another challenge to the hypothesis that lower term premia at the long end of the yield curve encourage corporate borrowing for investment purposes is the idea that changes to the term premia are short lived and generally irrelevant to firm investment decisions, particularly when they enter negative territory. Evidence that a reversal of LSAP effects on term premia occurs within a timeframe of one year is provided by Hanson & Stein (2015, p. 447), while Stein (2012) develops the argument that a reduction of the term premium suffers from a diminishing returns effect whereby “the financial constraint no longer binds and the relevant opportunity cost becomes the option to invest in short-term securities or repurchase shares” (p. 9, footnote 11). In fact, there are reasons to believe that policies which lead to an excessive reduction of the term premia may actually have a significant negative downside, fostering serious macroeconomic imbalances that threaten future economic growth prospects. As argued previously (see section 2.2.3), prolonged periods of low interest rates that encourage additional corporate borrowing may contribute to a renewed excessive and unsustainable build-up of debt, thus beginning a new leverage cycle, creating dangerous financial imbalances that increase the risk of financial crises (Hannoun, 2012, pp. 7-8; White, 2012, p. 25), reducing the pace of capital asset accumulation and increasing the present value of future liabilities of income-dependent financial institutions, ultimately increasing the savings rate rather than boosting spending and investment (White, 2012, pp. 11-12; Carney, 2016, p. 16).

Exhibit 8 offers support for the hereto presented criticism of the *term premia and corporate borrowing* channel. As we can see in the graph, leverage of the overall (non-financial) corporate sector has been on a steady rise since 2007 (green panel), with only a brief deleveraging evident amongst the S&P500 companies in the two-year period immediately following the crisis, which, however, was followed by a swift and drastic re-leveraging that has continued to the present day, bringing net debt to earnings before interest, taxes, depreciation and amortization (EBITDA) to levels well above those observed prior to the crisis (blue panel). Simultaneously, the corporate sector has accumulated a significant stockpile of cash and equivalents (short-term liquid investments such as Treasuries), which at the end of 2016 stood at \$1.54 trillion, double the level seen prior to the crisis (orange panel). Over the same period, however, in spite of record levels of borrowing and cash holdings,

investment has remained consistently below the average of the past three decades (pink panel).

Exhibit 8 Corporate leverage, cash holdings and non-financial investment, 2007-2016.



Source: Author’s elaboration on Federal Bank of St. Louis *FRED* data series (non-financial corporate business debt security holdings, book value), FactSet (S&P500 excluding financials cash and short-term securities holdings and S&P500 excluding financials net debt to EBITDA) and Bureau of Economic Analysis data series (private fixed investment by type, seasonally adjusted gross domestic product), author’s calculations.

Having highlighted the significant theoretical shortcomings of the yields and corporate borrowing channel, we move on to examine the empirical evidence on its effectiveness. Empirical studies of this channel can be divided into two strands – one examining the effectiveness of the LSAP programme in driving down yields on various groups of assets and the other questioning whether lower yields have made a significant contribution to stimulating economic activity in the post-crisis period. Evidence from studies examining the effectiveness of the Fed’s LSAP programme is mixed and generally inconclusive. Bauer and Rudebusch (2013, p. 7) provide evidence on the insignificance of the Fed’s purchases of government securities given the relatively small quantity of assets

purchased compared to the total US and global market for Treasuries, while Christensen and Rudebusch (2012) find little empirical support for the existence of a duration channel, finding instead that changes in interest rates resulting from LSAPs occurred via changes in expectations on the future path of short-term interest rates (pp. 19-20), a mechanism attributable to the signalling channel discussed at a later stage.

By contrast, Gagnon et al. (2010) come to the exact opposite conclusion, indicating that large-scale asset purchases were effective in lowering the term premium via the duration and local supply channels across a broad range of assets, including those not purchased by the Fed, with little impact on expectations for the future path of short-term interest rates (pp. 28-29). D'Amico et al. (2012) also find support for both the duration and the local supply channels (p. 443), although their quantitative estimates appear significantly different from those found by Gagnon et al. (2010). The findings of Krishnamurthy and Vissing-Jorgensen (2013) digress, with the authors arguing that operations involving Treasury securities predominantly affect government borrowing costs with little impact on yields relevant to the private sector (p. 102), highlighting the importance of expectations in the transmission of credit and quasi-debt management policy, in contrast to a further publication by Gagnon et al. (2013).

In summary, empirical evidence on the subject reflects a significant degree of uncertainty and it appears that conclusions of empirical studies undertaken to-date are highly sensitive to the methodology and the data series employed in their design. In addition, research focusing directly on changes to corporate (rather than Treasury) yields resulting from LSAPs is limited and studies mainly short-term movements in yields in response to monetary policy announcements (Thornton, 2014, p. 208).

To conclude our discussion of the yields and corporate borrowing channel of monetary policy transmission we consider the empirical evidence on the impact of yield changes on economic activity and find that, also on this front, results are conflicting. Most pre-2007 financial crisis literature, a review of which can be found in Rudebusch et al. (2007, p. 243), suggests that decreases in the term premium precede a slowdown in output growth, a view that is supported in a more recent, comprehensive study of interest rates and the causes of the 2008 financial crisis conducted by Maddaloni and Peydro (2010). Although Rudebusch et al. (2007) themselves provide novel statistical evidence, contradicting previous findings, which suggests that a compression of the term premium is associated with higher GDP growth (likely explained by a more accommodative financial environment for some classes of capital constrained borrowers) (p. 262), their results “appear quite sensitive to both the

specification of the forecasting equation and the choice of sample period used to estimate the model”, as argued by Ireland (2015, p. 125).

Reviewing the recent empirical literature on the relationship between the term premium and economic growth, Ireland nominates findings of a negative relationship, a relationship that is negative but short lived, findings of no significant relationship, and one study finding a positive relationship whereby higher term premia are associated with a faster pace of future output growth, generally describing empirical evidence to date as “weak and often conflicting” (p. 125). His own empirical work leads him to conclude that monetary policy does have an economically significant effect on term premia and that a compression of term premia does, in turn, have a positive impact on future economic growth; however, he underscores the complexity of this relationship and the role that other structural disturbances play in this interaction, moving “output, inflation, and bond risk premia in a variety of directions, helping to account for the shifting correlations between these variables seen in the data”. He concludes that “monetary policy affects bond risk premia and the economy; bond risk premia affect monetary policy and the economy, and the economy affects monetary policy and bond risk premia” (p. 139).

A simplistic relational representation, such as that offered by the *yields and corporate investment* channel, is thus an important misrepresentation of the complexity of interaction amongst the variables it aims to model, a quandary to economic analysis that is at the heart of the theory of complex dynamics, reflexivity and the mutually-recursive nature of economic growth determinants (see section 2.6.1).

Short-term interest rates and corporate investment

Given the lack of a theoretical or empirical basis allowing us to draw definitive conclusions regarding the aggregate impact of monetary policy’s manoeuvring of term premia at the longer end of the yield curve, we turn our attention to the subsequent task of analysing the theory and existing empirical evidence of the impact of short-term interest rates on corporate investment. The importance of short-term rates for corporate borrowing and investment, as opposed to long-term rates discussed previously, has been emphasized in various recent studies (Adrian & Shin, 2009; Maddaloni & Peydro, 2010).

Three possible mechanisms via which a downward movement in short-term interest rates may encourage corporate spending have been proposed, each of which is examined in detail hereafter. A consideration of this possible transmission channel of monetary policy

forces us to make at least two (possibly problematic) assumptions: first, we must cast aside the problem of the zero lower bound, beyond which the policy rate of interest in the United States has not moved to date; second, we disregard the possible problem of the divergence of market rates of interest from the policy rate, making an at times implicit assumption that changes in the policy rate of interest feed through at least to some degree to the market rates facing firms and corporations.

(5) Discount rates and project NPV

One possible channel via which short-term interest rates, and the expected path of short-term interest rates, may influence corporate fixed capital investment is via the opportunity cost of capital, or the discount rate that is used in the calculation of the net present value (NPV) of future cash flows of possible investment projects. According to this view, as the central bank lowers the policy rate of interest, the discount rate used in calculating the NPV of new investment projects falls and a greater number of potential investments present a positive NPV, with corporate investment consequently increasing (Emmons & Schmid, 2004; p. 2, Fu & Liu, 2015, p. 96). While the NPV rule has long been a centrepiece of corporate finance theory, decades of theoretical and empirical research have essentially failed to draw a direct link between monetary policy and corporate investment via this hypothetical transmission channel (Emmons & Schmid, 2004, p. 4).

A number of problems with the NPV theory have been highlighted, with one of the most notorious criticisms relating to the value of waiting and interest rate uncertainty substantiated by Ingersoll and Ross over two decades ago (1992). The authors highlight how, contrary to conventional wisdom, investment may actually fall when interest rates decline in cases where uncertainty simultaneously increases (p. 3),⁸⁶ and argue that, in the context of interest rate uncertainty, the NPV decision rule should be abandoned and that hurdle rates of decisions should be set significantly above break-even rates (pp. 27-28). In fact, a recent empirical investigation into the actual hurdle rates used by corporate decision-makers in evaluating investment projects has shown that these rates are significantly above the cost of capital and are also highly subjective; as such, investment decisions are not influenced by changes in the policy rate of interest (Lane & Rosewall, 2015, p. 6).

The theoretical basis of this transmission channel has also been challenged by Hamnsen (2004), who highlights the fundamental uncertainty, as described by Keynes (see

⁸⁶ An empirical confirmation of this is evidenced by Exhibit 4.

section 2.6.1), which characterizes the calculation of a project's NPV, a calculation that involves the estimation of cash flows of a given investment for possibly many years into the future. This process, he argues, is hampered by the absolute impossibility of assigning probabilities to the values in the calculation, which makes them estimates without any scientific basis subject to a non-ergodic process (see section 2.6.1), whereby past data cannot be used to form rational expectations for future values (pp. 4-5). Furthermore, complex dynamics also contribute to this uncertainty, as dependence on initial conditions of the economy means that "it may be impossible to accurately determine the Q_i 's [cash flows] in time 10 based on the data in time 1. Any small error in measuring the initial state of the world could result in large prediction errors" (p. 5). Given this context of fundamental uncertainty and complex dynamics, a small change in the policy rate of interest cannot counter the large swings in profitability calculations that occur when pessimism about future economic performance sets in (p. 10), rendering this formulation of interest rate policy transmission an unlikely representation of the generally elusive, subjective and volatile process of corporate investment decision making. In fact, empirical research suggests that in the years following the crisis, when the policy rate of interest fell precipitously, corporate managers not only did not lower the discount rate on projects under evaluation in anticipation of eventual rises in interest rates, but on the average increased it, assigning a greater risk premium in light of significant economic uncertainty (Dobbs et al., 2013, p. 26).

(6) *Q theory and equity financing*

An alternative representation of the transmission of monetary policy to aggregate demand via corporate investment is *q theory* and its variant, the *equity financing* channel. Although *q theory* is used by the Federal Reserve to model corporate investment decisions (see, for example, Edge et al., 2007, p. 17), it suffers from many of the same setbacks as does the discount rates and project NPV theory. *Q theory* in its traditional formulation suggests that a firm wishing to make an investment will always consider the market capitalization of an existing firm in the targeted line of business, making a comparison between the price of a takeover and the cost of a new venture investment in an identical enterprise. If the *q* ratio, defined as the market capitalization of a corresponding, existing firm divided by the cost of a new venture, is greater than 1, the entrepreneur will invest in a new venture, and vice versa (Tobin, 1969; Chirinko, 1993, pp. 1888-1889; Hamnsen, 2004, pp. 6-9; Boivin et al., 2010, p. 9). Monetary policy influences this decision-making process by decreasing the policy rate

of interest, increasing the net present value of existing companies and causing their stock market value to rise, thus increasing q and making new venture investment preferable to mergers and acquisitions. Aggregate investment consequently increases (Boivin et al., 2010, p. 9).

Unfortunately, this version of q theory has not fared well either under theoretical or empirical scrutiny. The uncertainty and scarce reliability of NPV calculations have already been discussed in relation to the *discount rates and project NPV* channel, and apply with equal validity to the calculations of NPV values that factor into stock market valuations of publicly traded firms. Further, Hannsgen (2004) argues that the relevant numerator value of q should be the marginal value of a new investment (marginal q), rather than the value of an existing business, but no empirically reliable measure of marginal q exists (p. 8). The use of stock prices in place of marginal q is problematic for another reason, as use of such an approach makes this theory reliant on the assumption that stock prices appropriately reflect the fundamental value of firms, an assumption that is highly problematic during periods of economic uncertainty, stock price volatility, and large-scale credit and quasi-debt management policy programmes, which, as previously argued, have the side-effect of distorting equity prices. Additionally, q theory suggests that corporate take-overs and investment decisions are a matter of rational optimizing behaviour, a suggestion that runs contrary to a framework of post-Keynesian ontological uncertainty and subjective, at times irrational, decision making (see section 2.6.2).

Empirical evidence has supported the latter view by illustrating that the majority of mergers and acquisitions are a failure (Deutsch & West, 2010), a longstanding phenomenon academic research has attributed to a variety of factors including sub-optimal decision making owing to the self-interest of participants, ambiguous information, limited human tolerance of stress, managerial hubris and numerous other elements that culminate in sub-optimal outcomes of takeovers (Jemison & Sitkin, 1986, pp. 155-156). Likewise, successful investment projects may at times prove elusive to the calculations prescribed by corporate finance theory. As Keynes (1947, p. 150) wrote, “[i]f human nature felt no temptation to take a chance, no satisfaction (profit apart) in constructing a factory, a railway, a mine or a farm, there might not be much investment merely as a result of cold calculation”.

A further examination of empirical studies into the validity of q theory leads to generally negative conclusions regarding the effects of lower interest rates on corporate investment in the context of this formulation of monetary policy transmission. Chirinko’s review of earlier empirical results on q theory highlights the generally poor performance of

this theory in most empirical studies conducted in the 1970s and 1980s (Chirinko, 1993, pp. 1892-1893) and Boivin et al. (2010) come to similar conclusions with regards to more recent empirical research (p. 11). Additionally, using empirical data on the volume of mergers and acquisitions and new investment in the United States from the 1960s through 2002, Medlen (2003) calculates a ratio of the former to the latter, and compares the behaviour of this statistic with one possible measure of q . While q theory would suggest the two series should move in opposite directions (that is, as q increases, new investment should be preferable to a takeover), the opposite appears true in Medlen's analysis, the purpose of which is "not to explain the anomalous result [...] but simply to note that not all is not well with Q theory" (*ibid.*, p. 697). It thus appears that to the theoretical weakness of this theory of monetary policy transmission we can add a ubiquitous rejection of its validity in empirical studies.

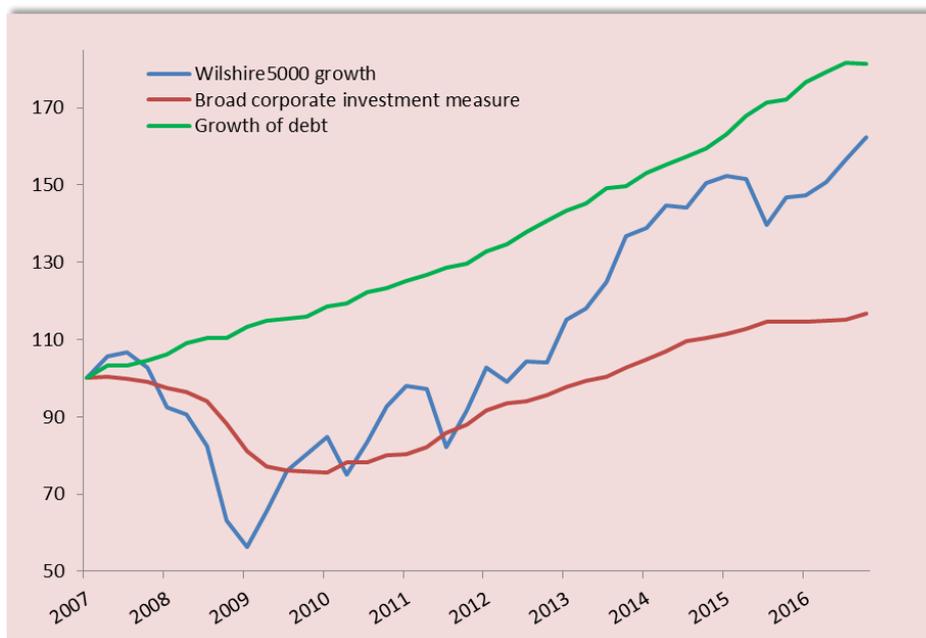
An alternative formulation of this channel of monetary policy transmission is the *equity financing* channel, which represents the effects of higher stock prices on small, equity constrained firms that rely on new equity issuance to finance marginal investment. While large US corporations tend to fund new investment from retained earnings (Hannsgen, 2004, pp. 10-11) and well-established corporations with higher ratings are rarely limited in their ability to issue debt or additional equity to fund new investment projects (as illustrated by the work of Covas & den Haan, 2011), small, young, cash-constrained and highly-leveraged firms frequently rely on equity issuance to fund rapid expansion and development. Baker, Stein and Wurgler (2002, pp. 1-2) provide evidence that this prototype of firms is sensitive to changes in stock prices, issuing new shares to fund investment at a time when stock prices are high, and choosing to wait when prices are low.

However, the use of monetary policy for the purpose of boosting stock prices and thus encouraging investment via the equity financing channel is highly questionable, as it may prove not only ineffective but possibly counterproductive and damaging in the longer term (Kregel, 2014a, p. 3). It has already been argued that the use of monetary policy to influence stock prices leads to a temporary divergence of equity valuations from fundamentals and to the muting of effective price discovery in the market, thus leading to speculation and to the unsustainable build-up of debt on the back of a temporary increase in wealth owing to the higher values of investor assets (see sections 2.2.3 and 5.2.3). The same firms that benefit from a temporary increase in the value of their stock are also put at risk of a future correction

in the equity markets,⁸⁷ when the monetary policy stimulus is removed in the context of improving economic prospects, precisely at a time when investment opportunities may be particularly plentiful and promising.

Mounting financial fragility in the non-financial corporate sector is clearly illustrated by Exhibits 9-11, which consider a number of data trends of the component companies of the Wilshire 5000 index, widely accepted as a benchmark for the aggregate US equities market. In Exhibit 9 we note the drastic divergence of growth rates between the volume of outstanding corporate debt, which in 2016 stood at 1.8 times its 2007 level, the total market capitalization of the component companies, which reached 1.5 times its 2007 level in 2016, and non-financial corporate investment, which in 2016 was only ten percent higher than it had been in the base year.

Exhibit 9 Wilshire 5000 index growth vs. growth in capital expenditure and debt, 2007-2016 (2007 = 100).



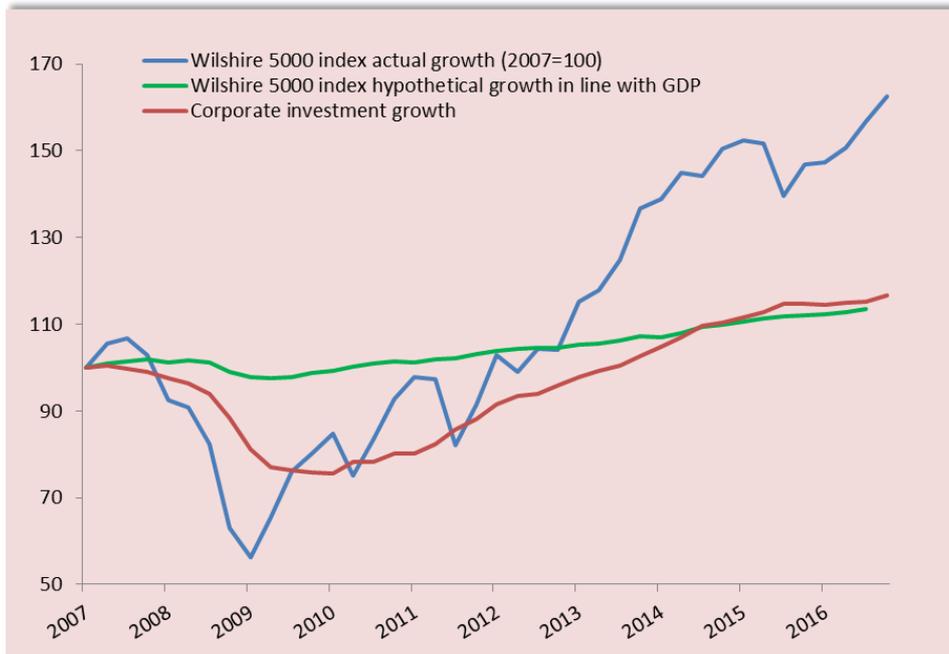
Source: Author's elaboration on Wilshire Associates (2017) data (Wilshire 5000 index historical value trend); Bureau of Economic Analysis data (private fixed investment by type, Table 5.3.1); Federal Reserve Bank of St. Louis *FRED* data (nonfinancial corporate business quarterly debt level series).

Exhibit 10 considers these characteristics from a different perspective, employing a hypothetical measure of the Wilshire 5000 index value on the assumption that it increased in line with GDP growth during the 2007-2016 period. This illustration confirms that over the

⁸⁷ Central bankers admit to the temporary nature of monetary policy's effects on asset prices (see, for instance, Carney, 2016, p. 13), a subject that we discuss in greater detail in the context of balance sheet policy.

course of ten years, this hypothetical measure of the index value growth is broadly in line with the growth of corporate investment and is significantly lower than the actual growth of the index during the period under consideration.

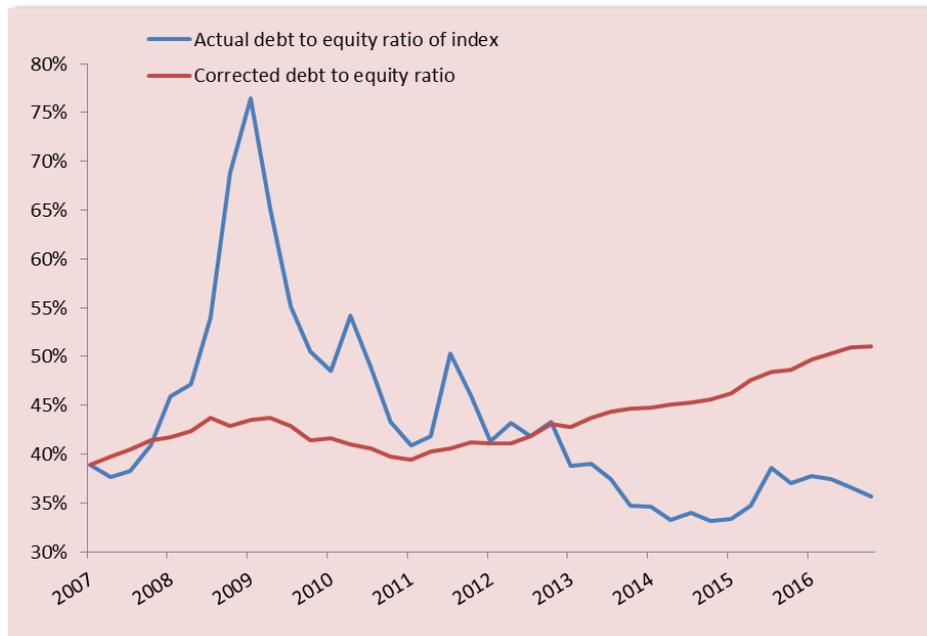
Exhibit 10 Wilshire 5000 index actual vs. hypothetical growth & growth in corporate investment, 2007-2016 (2007 = 100).



Source: Author’s elaboration on Wilshire Associates (2017) data (Wilshire 5000 index historical value trend); Bureau of Economic Analysis data (real quarterly gross domestic product; private fixed investment by type, Table 5.3.1).

Finally, Exhibit 11 employs the same hypothetical measure of index value growth as in Exhibit 10, presuming a growth rate in line with the growth of GDP. While the debt to equity ratio which uses the actual market value of the Wilshire 5000 index shows a steady decline in this key ratio since the crisis, the corrected ratio shows a gradual increase, as illustrated by the red line in Exhibit 11. The critical conclusion that we can draw from the analysis of these actual and hypothetical data trends is that the market value of US corporations is gradually moving away from its fundamental value, based on investment and GDP growth rates, while indebtedness continues to increase, though it remains masked by the persistent rise in equity valuations. If financial market tensions were to cause equity values to drop precipitously, as they did in 2008 (evidenced by the sharp spike in the blue trend line in Exhibit 11), corporate debt ratios could soar to an even greater extent than they did in the previous crisis.

Exhibit 11 Wilshire 5000 index actual vs. hypothetical debt to equity ratio growth, 2007-2016.



Source: Author's elaboration on Wilshire Associates (2017) data (Wilshire 5000 index historical value trend); FRED Economic Data (nonfinancial corporate business quarterly debt level series).

(7) Corporate credit (cash flow) channel

The *corporate credit* formulation of the interest rate channel has been analysed from two alternative perspectives in theoretical and empirical literature. The earlier rendition of this channel focuses on the effects of a decrease in the policy rate of interest on firms' and corporations' cost of borrowing and the consequent positive impact on cash flow, which leads to an increase in investment spending. Bernanke et al. (1998) made an important contribution to the elaboration of this theory by highlighting the significance of the risk premium faced by corporate borrowers and their resulting preference to spend out of retained earnings, largely determined by cash flow, which in turn determines their ability to make marginal investment.

In the framework of the corporate credit channel of monetary policy transmission, the relevant rate is the nominal short-term interest rate, rather than the real long-term rate as in previously discussed channels, since payments on short-term debt, constituting the majority of interest payments, have the most significant impact on corporate cash flow (Boivin et al., 2010, pp. 20-21) and thus on corporate investment, an argument that can be traced back to Hyman Minsky's analysis of the impact of debt servicing of the existing stock of debt on current investment (Hamnsen, 2004, pp. 15-16; Fazzari et al., 2008, p. 556).

The second strand of theory that considers the impact of nominal short-term interest rates on the cost of borrowing and the link to corporate investment emphasizes the positive impact of increased cash flow on credit constrained firms' balance sheets and thus on their access to additional borrowing, which in turn permits them to make marginal investment, increasing aggregate demand (European Central Bank, 2011, p. 60; Reza et al., 2015, p. 2).

While most leveraged firms and corporations undoubtedly benefit financially from lower short-term interest rates, the hypothesis that a decrease in the policy rate of interest necessarily increases aggregate demand via this transmission channel is not without its weaknesses, some of which have already been discussed in the context of other interest rate channels. For example, additional issuance of cheaper debt may be used for debt restructuring, whereby firms retire existing debt with the use of funds generated from cheaper new issuances (Greenwood et al., 2010, p. 997), or, as discussed previously, for the purpose of dividends or share buybacks, as illustrated by empirical evidence presented by Stein (2012, p. 9) and in Exhibits 6 and 7. Further, there is evidence that in the years following the 2008 crisis, non-financial corporations built up a significant stockpile of cash, possibly explained as a precautionary move in light of uncertainty and perceived negative future economic prospects as well as risks of future credit constraints (Bates et al., 2009; Sanchez & Yurdagul, 2013, pp. 5-6) – a predictable consequence of ontological uncertainty described in the post-Keynesian theoretical framework by the 'precautionary motive' of money demand originally identified by Keynes (see section 2.6.2), applicable not only to the financial sector but also to the corporate sector. The accumulation of cash since the crisis is evident amongst non-financial corporations and firms, which have chosen to keep most of their newly-created liquidity invested in US Treasuries (MacMillan et al., 2014, p. 86), and is a trend that has had a significant negative impact on aggregate corporate investment (see Exhibit 8 for corporate cash accumulation and investment trends), long-run capital accumulation and output (Bacchetta et al., 2015, pp. 4-6).

Hence, a reduction in short-term interest rates may suffer from a diminishing returns effect (Stein, 2012, p. 9; Hanson & Stein, 2015, p. 447), much like a reduction in long-term rates discussed above, whereby in the context of an aggregate desire to deleverage and consequent weak demand for borrowed funds by firms and corporations, a further reduction in the policy rate of interest will have no marginal impact on corporate borrowing and investment. In fact, recent empirical research undertaken by den Haan et al. (2007) shows that, contrary to the predictions of the corporate credit channel, a reduction in the federal funds rate prior to the crisis was linked to a reduction in the aggregate quantity of corporate

and industrial loans and business investment, while an increase in the rate was associated with a rise in both borrowing and investment (p. 921), as shown in part by Exhibit 4.

Clearly, factors other than the short-term policy rate of interest act as dominating determinants of corporate investment behaviour, an assertion most vividly illustrated by the significant trend of underinvestment by businesses in the US economy since the financial crisis of 2008 in spite of a prolonged period of record low levels of the federal funds rate. This trend is documented in a detailed analysis by economists at Morgan Stanley (Reinhart et al., 2014), who find that non-residential fixed investment declined across all major categories in the 2008-2014 period, creating an important hindrance to the aggregate recovery and inflicting “lasting damage” on the US economy (p. 2) (see also Exhibits 3 and 4).

The results of the preceding evaluation of monetary policy transmission to the corporate spending and investment component of aggregate demand via interest rate channels are thus wholly unfavourable to the hypothesis of effectiveness. The conclusions of our analysis provide a detailed illustration of the complicated nature of corporate decision making, offering a justification as to why an unprecedented dose of monetary policy stimulus has failed to jump-start corporate investment spending, an undoubtedly fundamental element in the determination of endogenous, non-ergodic long-term economic growth (see sections 5.2.2 and 5.2.3). Before drawing definitive, comprehensive conclusions on the effectiveness of interest rate policy in stimulating aggregate demand in a post-crisis economic environment, we consider a number of theoretical transmission channels via which monetary policy has been postulated to impact household consumption spending, another critical component of aggregate demand and long-term economic growth.

3.1.2 HOUSEHOLD CONSUMPTION CHANNELS

The subgroup of interest rate channels that considers the impact of monetary policy on household consumption in the market for goods and services is composed of three hypothetical sub-channels, which we now examine in detail. The consumption component of the interest rate channel has a long history of thought, belonging to the portfolio of the principle transmission channels in neoclassical literature,⁸⁸ but has received relatively scarce attention in more recent research, which has favoured the analysis of bank lending and asset price channels. Such academic neglect of consumption channels of monetary policy may be

⁸⁸ See, for example, the 1970s debate centred on Modigliani’s interpretation of monetary policy’s effectiveness in stimulating consumer expenditure (Modigliani, 1971).

justifiable in the post-2008 crisis period, as at the aggregate level consumer spending appears to have responded poorly to the unprecedented low interest rate policy, with saving rates remaining above pre-crisis levels as of the end of 2014, and real personal consumption levels generally remaining significantly below those witnessed before the crisis (Federal Reserve Bank of St. Louis, 2017; Exhibit 12), in spite of record-low overall household debt service costs and household debt at pre-2008 crisis levels (Federal Reserve Board, 2016a, p. 12; Exhibits 13, 15 and 16).

To shed light on the lacklustre developments in consumer spending from a theoretical and empirical perspective of monetary policy transmission, we move on to examine the role of intertemporal substitution effects, the wealth effect of real estate prices and the impact of debt service costs on the households' investment and savings decision.

(8) *Rational expectations and intertemporal substitution*

The role of *rational expectations and intertemporal substitution* effects on household consumption decisions is central to the neoclassical view of monetary policy transmission, and is presumed to work in part along the same channels as the *long-term interest rates and fixed capital investment* channel of corporate spending discussed previously. As real long-term interest rates fall owing to sticky prices in response to a downward movement of the policy rate of interest, in a world of rational expectations households increase their residential housing investment and consumer durables expenditure, in light of lower returns on savings and on the presumption of improved future economic prospects, leading to a rise in aggregate output (Mishkin, 1996, pp. 2-3).

The fall in the nominal short-term interest rate has an important impact, according to this view, as lower short-term rates, which represent the price of current versus future consumption, encourage consumption today at the price of consumption tomorrow, a concept referred to as intertemporal substitution (European Central Bank, 2011, p. 60). This representation of monetary policy transmission is introduced into most standard DSGE models via the Euler equation (Boivin et al., 2010, pp. 12-13; Crump et al., 2015, p. 1), which relates present and future consumption by a utility maximizing representative household, taking into account time preference and the opportunity cost of consumption, as reflected by the real interest rate that can be earned on savings over a given horizon. As in the *inflation expectations and corporate investment* channel, expectations play an important role in the traditional formulation of this household consumption channel, as current interest rate

policies influence expectations on the path of future interest rates (the expectations hypothesis) and consequently on economic growth and inflation, according to which households adjust their savings and investment decisions (Reza et al., 2015, p. 2). Specifically, lower current interest rates are presumed by households to imply higher future inflation and hence lower long-term real interest rates, providing a stimulus to aggregate demand.

This theoretical formulation of monetary policy transmission suffers from a number of problems and can be criticized from both a neoclassical and a heterodox perspective. First, the assumption that lower current interest rates suggests higher future inflation rates and thus lower long-term real interest rates ignores the likelihood that the monetary authorities would raise interest rates in the future, a consequence that within the neoclassical framework would also follow evidence of an acceleration in economic growth (a dynamics represented by the idea of time inconsistency of central bank policy in mainstream literature). The positive impact of revised inflation expectations on current spending is questionable for other reasons. For example, there is evidence that when households revise their inflation expectations upwards, expectations on nominal income remain unchanged, creating a negative income effect that lowers spending in the present as well as the future (Burke & Ozdagli, 2013, p. 5). Leaving the realm of neoclassical theory, we recall the discussion of the post-Keynesian view on interest rate policy and inflation, and our conclusions that there is no theoretical or empirical support for the view that low policy rates of interest invariably lead to higher inflation rates in future periods (see sections 1.13 and 1.14 as well as Exhibit 5).

Emblematic of the problems associated with monetary policy transmission via intertemporal substitution is the admission by prominent central bankers of the ineffectiveness of such policy. Even if interest rate policy could induce intertemporal substitution, thus stimulating current spending at the expense of future spending, its effects would be so temporary as to render reliance on this policy not only fundamentally ineffective but also dangerous; as the effects of the initial increase in consumption wither, maintenance of this stimulus would require ever greater doses of monetary policy to bring yet more spending from the future into the present (King, 2013, p. 4; Carney, 2016, p. 12). Fundamental uncertainty is another critical explanatory factor of the ineffectiveness of policy via this channel. At times when low interest rates are a sign of economic malaise, as they often are, future economic prospects are dim or at best uncertain, and the *option to wait* increases in value for households evaluating spending decisions, much as it does for firms and corporations evaluating investment options. Households therefore may choose to save for

an uncertain future, in spite of low rates of return on deposits and obligations. In fact, as we see from Exhibit 12, savings as a percentage of disposable income in the post-crisis period have remained significantly above the levels seen in 2007.⁸⁹ More specifically, while in 2007 households saved on average around 3 percent of disposable income, by 2013 this figure rose to a peak of 9.2 percent, gradually falling thereafter but remaining well above the 2007 level.

Exhibit 12 Personal savings and consumption, % of disposable personal income, 2007-2016.



Source: Author’s elaboration on Bureau of Economic Analysis data (Table 2.1 Personal income and its disposition).

What does empirical evidence have to say on the importance of intertemporal substitution in the transmission of monetary policy to aggregate demand? Earlier empirical studies suggest a minimal effect of intertemporal substitution on household spending, with the consistency of these findings leading to an exclusion of this transmission channel from the Federal Reserve’s FRB/US econometric forecasting models, as well as the equivalent of the European Central Bank (ECB) (Boivin et al., 2010, p. 14). Interestingly, a recent examination by Havránek (2013) of nearly 3,000 estimates of the elasticity of intertemporal substitution reported in 169 journal articles finds an important positive bias in the reporting of

⁸⁹ The difference between personal consumption and personal saving, as calculated in the Bureau of Economic Analysis Table 2.1 (personal income and its disposition) is composed of personal non-mortgage interest payments and personal current (non-tax) transfers to the government and the rest of the world.

elasticity estimates, suggesting that actual elasticities are even smaller than the reported average.

Additionally, Kaplan et al. (2016) provide unique research insight using an alternative empirical model that sets aside the standard New Keynesian RA framework that employs the Euler equation of the representative household in favour of a proprietary heterogeneous agent model that incorporates a two-asset investment market and reflects greater complexity of household consumption behaviour (pp. 12-16). Their findings highlight the insignificance of direct consumption effects (the positive impact on consumption via intertemporal substitution) of low interest rate policy since households in the new model have the option to invest in less liquid assets with a higher return than in standard models with a one-asset structure (that is, bank deposits), and show a preference for such investments over consumption (portfolio rebalancing). Direct consumption effects are also muted by the negative wealth effect, which represents the negative impact on high liquid wealth households of low interest rates and which results in lower income from net interest earnings and consequently lower consumption⁹⁰ (p. 36).

(9) *Cost of real estate capital*

The *cost of real estate capital* channel is an alternative formulation of the household consumption channel that has been proposed as an additional method for monetary policy to boost aggregate spending, in light of the disappointing results of theoretical and empirical investigations on the hypothesis of intertemporal substitution. A detailed exposition of this path of transmission is provided by Mishkin (2007), who illustrates how interest rate policy impacts aggregate demand via the cost of residential capital, a mechanism that is best captured by the following cost formula:

$$c = P_h [(1-t)i - \pi_h^e + \delta],$$

whereby the return on an investment in residential real estate (that is, the cost of capital), c , is calculated based on P_h , or the initial cost of the property, and three further variables, namely, $(1-t)i$, a marginal tax rate-adjusted long-term rate of interest relevant to the related mortgage, π_h^e , the expected appreciation rate of real estate values and δ , the estimated depreciation rate

⁹⁰ We refer to this as the *negative income channel* of monetary policy transmission and discuss it in detail in Chapter 4.

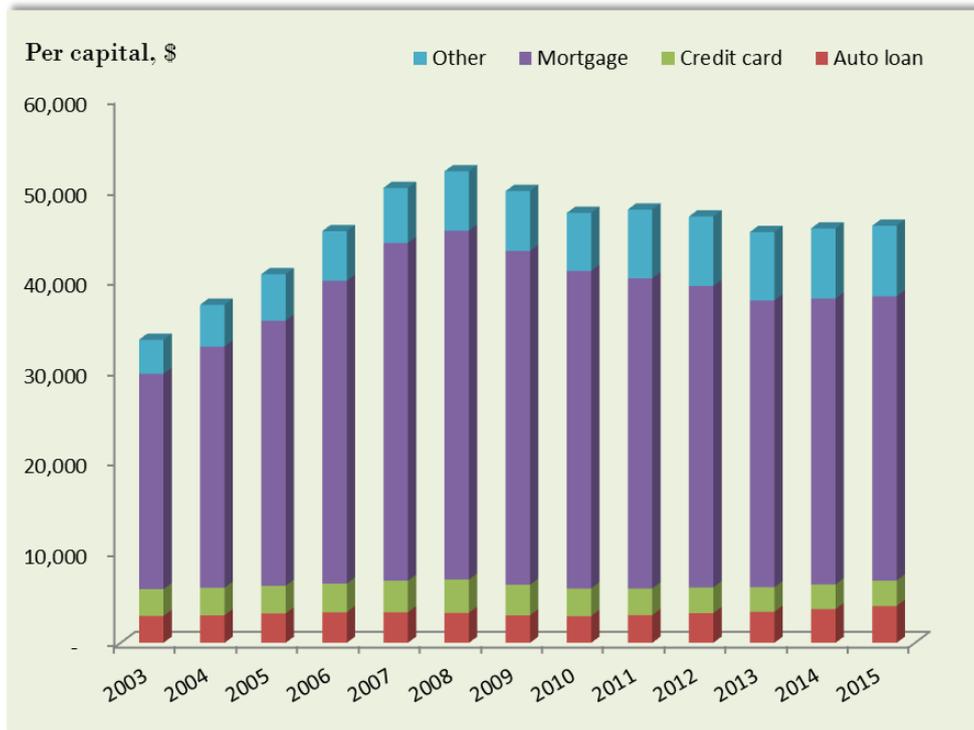
of the property. According to this theory, a decrease in the policy rate of interest causes long-term interest rates to fall (a presumption of neoclassical theory already discussed in the context of several other transmission channels), putting downward pressure on expected average mortgage rates, thus decreasing the cost of capital and increasing demand for residential housing (*ibid.*, p. 6). Increasing demand for residential housing improves the general prospects of the real estate sector, raising the expected rate of appreciation of real estate values, further increasing housing demand and aggregate output (Boivin et al., 2010, pp. 11-12).

Empirical investigations into the elasticity of housing demand to the cost of capital for the United States have generally been inconclusive, yielding results that range from -0.2 to -1.0 (Mishkin, 2007, p. 6), possibly suggesting that the value of elasticity is highly variable and context-dependent. For example, consumption has been found to respond more strongly to interest rate changes via this channel in countries with a predominantly variable rate mortgage structure (Calza et al., 2009; Garriga et al., 2013), which was the case of the United States in the mid-1990s, amongst other historical time periods. However, the percentage of adjustable rate mortgages (ARMs) in the overall mortgage pool was on the fall in the subsequent 20-year period, decreasing to rates of between 40 percent and 50 percent in the two years prior to the 2008 crisis (Moench et al., 2010, p. 2), and to just 7 percent of total mortgages in July 2015 (Fisher & Kan, 2015). In fact, historically, the share of ARMs decreases in periods when the yield curve is relatively flat or inverted (Moench et al., 2010, p. 2), suggesting that monetary policy is least effective via this channel precisely at times where stimulus is most needed.

In addition, and much like in the case of firms and corporations in the post-crisis period, a trend of mortgage repayment amongst households further weakens the links of the cost of real estate capital channel. The percentage of households' home mortgages to total liabilities has shown a continuing downward trend since 2009, decreasing from a range of 73-74 percent during the 2005-2009 period, to 65 percent in 2015,⁹¹ a trend illustrated in Exhibit 13, which shows the per-capita household debt levels by debt category. The graph shows that overall household debt deleveraging took place from 2008 to 2013, driven by a reduction in mortgage debt, which makes up the majority of household debt obligations. While overall debt levels began to creep up in 2014, per-capita mortgage debt obligations continued to fall through 2015, while per-capita credit card debt continued falling through 2014.

⁹¹ Figures are based on the author's own calculations from the Flow of Funds Accounts data.

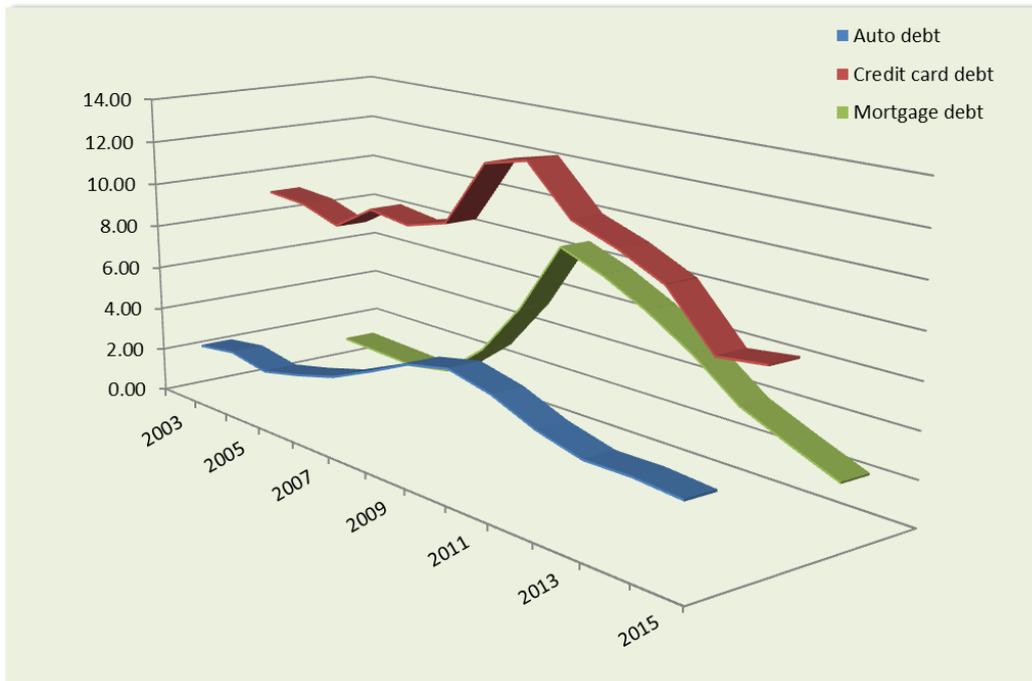
Exhibit 13 Household per capita (\$) debt levels by category, 2003-2015.



Source: Author’s elaboration on Federal Reserve Bank of New York Consumer Credit Panel / Equifax data (state-level household debt statistics series).

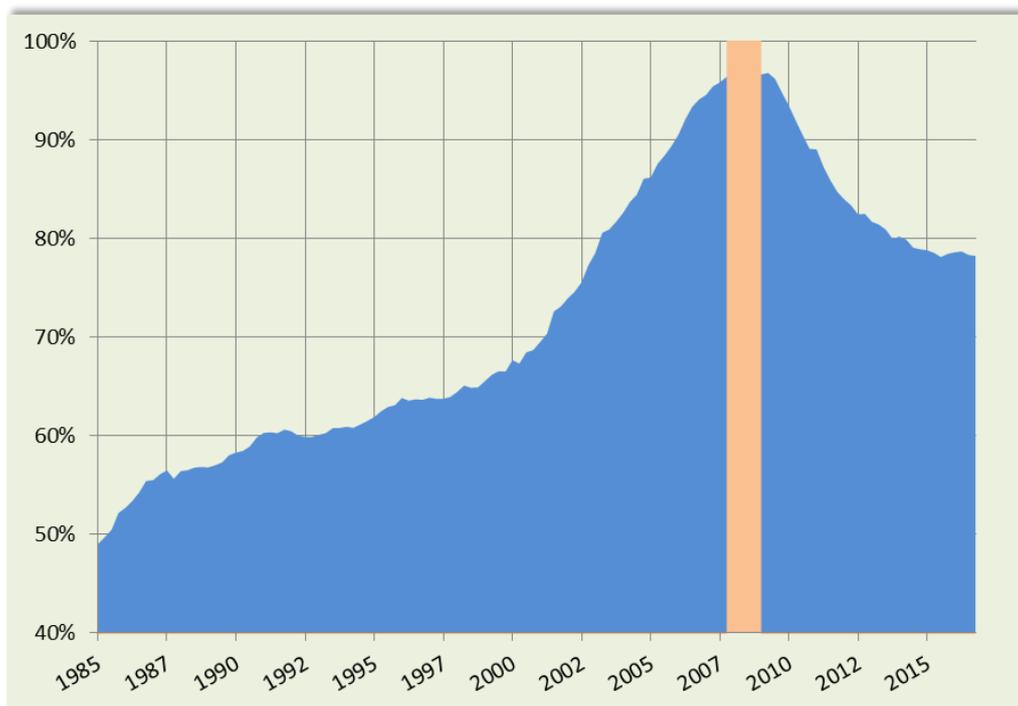
Furthermore, delinquency rates on household debt obligations rose drastically during the crisis, decreasing much more gradually thereafter, as illustrated in Exhibit 14. Consumer debt began to climb around the same time that delinquency rates reached pre-crisis levels, a rise driven predominantly by an increase in per-capita auto loans as well as the volume of student loans, which has been increasing consistently since the pre-crisis period. In a historical context, however, the re-leveraging that began in 2014 has been so minimal that it is virtually imperceptible in the representation of a long-term trend, as illustrated in Exhibit 15, although in relative terms household leverage remains at historically significant levels even in the aftermath of the financial crisis of 2008 (shown in orange) and the subsequent process of household deleveraging. More precisely, household debt as a percentage of GDP increased from below 50 percent of GDP in 1985 to a peak of 98 percent in 2007, subsequently falling to 78 percent over the course of the deleveraging, which ended in the fourth quarter of 2014 and remaining generally stable thereafter.

Exhibit 14 Delinquency rates (%) by debt category, 2003-2015.



Source: Author’s elaboration on Federal Reserve Bank of New York Consumer Credit Panel / Equifax data (state-level household debt statistics series).

Exhibit 15 Household debt as % of GDP, 1985-2016.



Source: Author’s elaboration on Bureau of Economic Analysis data (Table 1.1.5 gross domestic product) and FRED data (household credit market instruments).

Taken together, these trends are symptomatic of strained household balance sheets and a deleveraging predominantly in the market for real estate, a dynamics that has been highlighted as one of the major explanatory factors for weak aggregate demand in the post-crisis years (Tarullo, 2011). Deleveraging has occurred in spite of record-low interest rates and falling housing prices, which according to the cost of real estate capital model should have encouraged additional investment in residential property. In a much-quoted empirical investigation into the causes of persistent post-crisis unemployment, Mian and Sufi (2012) show that balance sheet shocks experienced by high-leverage households in light of the collapse of residential housing prices are responsible for a sharp decrease in consumption, a finding that is indicative of the conflicting impact of the negative wealth effect and the cost of capital channel in determining the outcome of household consumption trends in the post-crisis period.

(10) *Household credit (cash flow) channel*

The *household credit (cash flow)* channel is similar in assumptions and implications to the corporate credit channel discussed previously. Hypothetically, the central bank's interest rate policy works by lowering the current cost of debt servicing for households, encouraging them to take out new loans to fund spending, and simultaneously decreases interest payments on variable-rate debt (or permits them to re-negotiate the terms on the existing stock of debt), lowering the interest burden, improving cash flow and hence increasing aggregate spending (Calza et al., 2009, p. 27; European Central Bank, 2011, p. 60). These two hypothetical paths of transmission via the credit channel warrant independent examination, since, theoretically, in the context where a lower policy rate of interest is accompanied by a general deleveraging, rather than increased borrowing to fund spending, lower interest rates may nonetheless benefit consumers by lowering existing service costs and improving cash flow.

Given the important role of consumer leverage in the creation of financial imbalances that ultimately contribute to a financial crash (Dimova, 2012) and the documented process of deleveraging (motivated by precautionary saving amongst households), which occurs in both the mortgage as well as other consumer credit markets following the crisis⁹² (Guerrieri & Lorenzoni, 2011; Di Maggio et al., 2014; Exhibit 13), at best it can be argued that low interest rate policy may be beneficial in stimulating borrowing by households only after the

⁹² The only exception in the post-2008 crisis period was the student loan credit category (included under 'other' in Exhibit 13).

period of desired deleveraging has come to an end.⁹³ In the case of the 2008 crisis, empirical evidence suggests that such a period can be protracted: the household deleveraging trend continued for over five years, beginning to decelerate in 2013 and reversing in 2014, with household debt levels remaining well below the 2008 peak throughout the end of 2015 (Haughwout et al., 2014; Brown et al., 2016; Exhibits 13 and 15). Repeated efforts to stimulate the economy via reductions in interest rates at the start of the lengthy period of deleveraging eventually lead monetary policy to the limit of the zero bound, beyond which interest rates in the United States have not moved to-date.⁹⁴ As we have argued previously, a prolonged period of near-zero interest rate policy is in itself a destabilizing factor that can promote problematic alterations in economic activity that set the scene for subsequent financial crises (see section 2.2.3 and Chapter 5).

The argument that a lower policy rate of interest may stimulate aggregate demand by improving households' cash flow even in the absence of increased borrowing has been offered as an additional formulation of the household credit, or cash flow, channel. In this formulation, monetary policy may therefore positively impact aggregate demand even during the process of voluntary deleveraging, by lowering interest payments on existing, rather than marginal, household debt. Existence of such a transmission channel, however, is dependent on the assumption that a lower policy rate of interest is actually transmitted to consumers, even in an economy where the majority of mortgage rates are fixed rather than variable, as is the case of the United States, and on the further assumption that households exhibit a propensity to spend the additional cash flow, rather than to save or to speed up the on-going process of deleveraging.

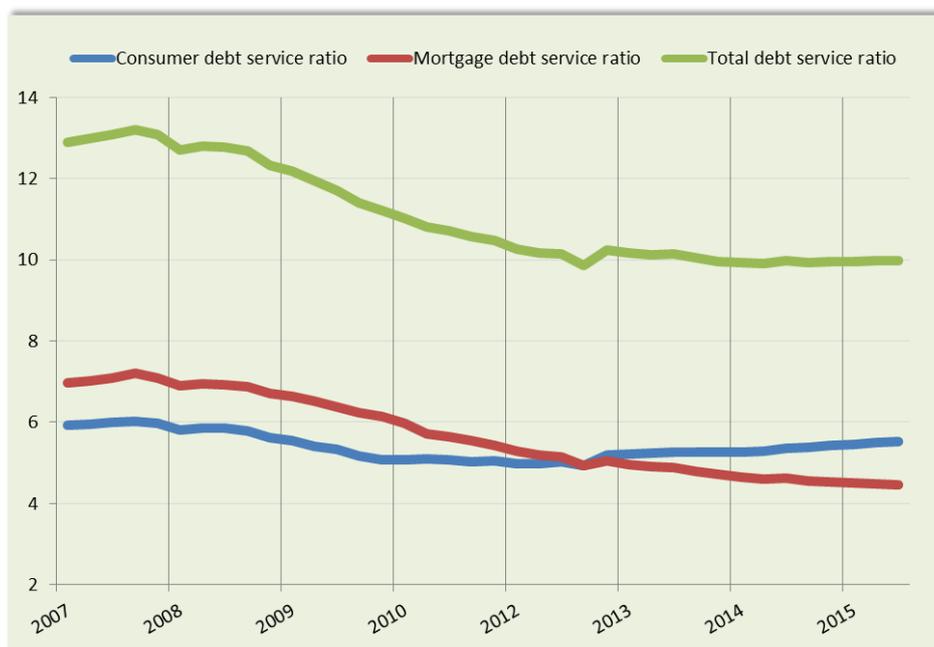
On the first point, evidence suggests that in the period following the 2008 crisis and in spite of the introduction of additional monetary policy programmes aimed at easing household credit constraints, the pass-through of interest rate decreases from lenders to households has been significantly weaker than in the pre-crisis period across banks and in both the mortgage and the auto loan markets (Mora, 2014, p. 112), a subject that benefits from further elaboration in the subsequent chapter, which addresses bank lending channels of monetary policy transmission. Furthermore, and equally important, are the findings of a number of recent studies that highlight the crucial difference in the transmission of interest rate policy in economies characterized by variable versus fixed rate mortgage structures (Di

⁹³ The subject of the role of consumer debt in growth dynamics and the creation of macroeconomic imbalances is elaborated on to a significant extent in Chapter 5.

⁹⁴ The implications and nature of the so-called post-crisis 'balance sheet recession' in the household and the corporate sector are considered in greater detail in section 5.1.

Maggio et al., 2014, p. 39; Flodén et al., 2016), supporting the intuitive idea that US households, which hold predominantly fixed rate mortgages, benefit less from interest rate reductions than their counterparts in economies with a larger portion of flexible rate debt.

Exhibit 16 Household debt service costs as % of disposable income, 2007-2016.



Source: Author’s elaboration on Federal Reserve Board data (household debt service and financial obligations ratios).

A brief look at the data suggests that household debt service costs as a percentage of disposable income have benefitted from only a moderate decrease in the period since shortly before the crisis, as illustrated by Exhibit 16. Specifically, the total debt service ratio has decreased from approximately 13 percent in 2007 to 10 percent in 2016, a decrease that can be assigned almost entirely to the decrease in the mortgage debt service ratio, driven by the significant deleveraging in this market, whilst the decrease in the overall consumer debt service ratio (which excludes mortgages) has been minimal.

An examination of existing evidence on households’ propensity to spend the additional liquidity that accrues as a result of lower interest rate payments exposes a degree of disparity. Evidence presented by Di Maggio et al. (2014) suggests that households benefiting from interest rate resets on variable rate mortgages do respond positively by consuming more durable goods, although a more detailed analysis by the authors reveals that

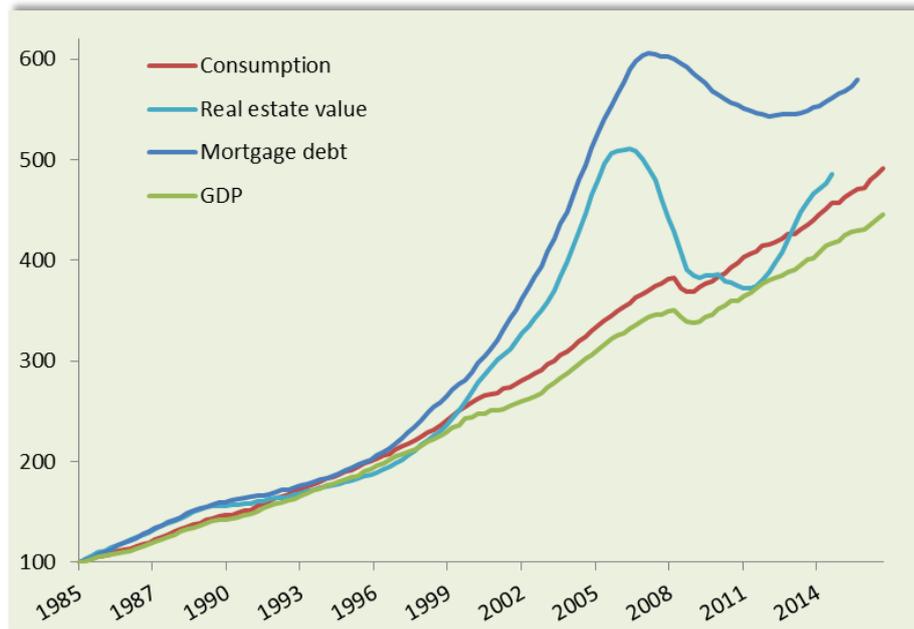
high-leverage households have a significantly greater propensity to consume than low- and average-leverage households, who invest more of the additional income flow in paying down the existing stock of debt and building equity (p. 26). By contrast, Keys et al. (2014) find that the more indebted, credit-constrained borrowers use a significant, though gradually decreasing, portion of additional income from decreasing mortgage payments to repay existing debt, rather than to increase consumption (p. 21), offering support to the contestation that “borrower credit outcomes exhibit substantial dispersion due to differences in creditworthiness, income, or location” (*ibid.*, p. 2). We further recall the findings of Kaplan et al. (2016, p. 36), who argue that portfolio rebalancing and negative wealth effects have an important offsetting impact alongside any positive effects of interest rate policy on consumption, highlighting the importance of considering not just the direct, but also the indirect effects of monetary policy on consumer’s financial circumstances and consequent behaviour. Supporting the latter view, macroeconomic data trends suggest that personal savings as a percentage of disposable personal income have doubled, from circa 3 percent in 2007 to circa 6 percent in 2016 (with a peak over 9 percent in 2012), while personal consumption levels have fallen, remaining below pre-crisis levels in 2016 (see Exhibit 12).

In light of this wide dispersion of findings and interpretations in the area of empirical investigation into the aggregate effects of interest rate policy on consumer spending via household credit (cash flow) effects, it is challenging to draw definitive quantitative conclusions on the degree of stimulus that policy provides via this channel. However, the continuing trend of weak aggregate demand in spite of the prolonged period of near-zero interest rates (Summers, 2014b, pp. 66-68) suggests that it would be unreasonable to expect significant further stimulus to household spending via the household credit channel beyond what has been achieved by monetary policy thus far. Furthermore, the zero lower bound imposes an effective limit on the degree and duration of policy via this channel, and the risks associated with a protracted period of excessively low interest rates, discussed previously and considered further in Chapters 4 and 5, hold monumental implications for the sustainability of the economic recovery and medium- to long-term economic growth.

Taking a look at the trends of a number of relevant data series since 1985, we have a visual confirmation of the theoretical and empirical conclusions we have thus far drawn on the relevance of the household consumption channels of monetary policy transmission. Exhibit 17, which shows the growth trends of four relevant variables over the past three decades, illustrates that consumption has been growing at a slightly higher rate than has GDP (explained by the persistent trade deficit of the United States and funded by growing

household indebtedness, as shown in Exhibit 13 and 15),⁹⁵ while mortgage debt and real estate values have skyrocketed by comparison. We further note that, while the growth of mortgage debt shadowed the growth of real estate values until the crisis, the two trend lines diverge significantly thereafter, with real estate values remaining far below the levels of mortgage debt held by households at the start of 2015.

Exhibit 17 Household consumption, real estate value, mortgage debt and GDP growth, 1985 = 100.



Source: Author's elaboration on Bureau of Economic Analysis data (Table 2.1 Personal income and its disposition, Table 1.1.5 Gross domestic product), FRED Economic data (household real estate at market value, mortgage debt outstanding).

Of further significance is the consideration that the substantial accumulation of debt by households has occurred during a period of historically low levels of the interest rate, which has remained below the 1985-2016 average rate for most of the time since 2001 (see Exhibit 4) around the time when the particularly noteworthy growth in mortgage debt and real estate prices began. It is, therefore, questionable how sustainable such debt levels will prove to be at higher rates of interest, should they materialize in the near future. Against this backdrop, we can argue with confidence that monetary policy which aims to encourage consumption by promoting higher household leverage and rising values of real estate is

⁹⁵ For an enlightening explanation, based on the examination of the flaws of the domestic and international monetary system, of how the United States manages to maintain a persistent trade deficit vis-à-vis its trading partners in the long term, see Rossi (2011a) and Cencini & Rossi (2015, Chapter 11).

misguided. While real estate prices can and do correct, as happened during and in the years after the real estate crash of 2007, shown in Exhibit 17, household deleveraging can occur either via increased delinquency rates or a repayment of mortgage debt, which necessarily involves the sale of property or downsizing and has an inevitable and important negative impact on household balance sheets, wealth prospects and well-being, as argued previously, and consequently on long-term aggregate demand and endogenous growth dynamics.

Remarkably, the conclusions that the preceding analysis of corporate and household interest rate channels yields are starkly reflective of the arguments advanced by Palley (2002) six years prior to the onset of the 2008 recession. Palley's "aggregate demand generation thesis" attests to the "danger of a lasting growth recession [which] reflects the emergence of systematic contradictions in the US economy that pose a long-term aggregate demand generation problem" (p. 11). According to this thesis, the absence of a sustainable source of aggregate demand and deteriorating income distribution have, since the 1990s, been masked by unsustainable economic growth based on rising stock prices and ballooning household debt, amongst other problematic dynamics, or so-called temporary "margins of compensation" (p. 13) (see sections 5.2.1-5.2.3 for further elaboration on the subject). In Palley's framework, Federal Reserve interest rate cuts do nothing to remedy the underlying problem, but merely propagate the continuation of a debt-driven business cycle characterized in the longer term by a persistent decline in long-term interest rates and deflation, which, in turn, support periodic waves of mortgage refinancing that superficially sustain consumer spending (pp. 22-23).

Recent macroeconomic events have lent significant support to Palley's thesis of a fundamental aggregate demand generation problem. Regrettably, endorsing Palley's hypothesis necessitates accepting his prognosis of a bleak economic future characterized by leverage and stock price-driven boom-and-bust cycles and drawn out periods of recession, which Federal Reserve policies are powerless to remedy and likely only to exacerbate in the absence of a drastic revision in the approach to monetary policy and macroprudential regulation (see section 5.4).

3.2 BALANCE SHEET (ASSET PRICE) CHANNELS

Our hitherto discussion has underscored a significant number of weaknesses in the theoretical framework of interest rate channels of monetary policy transmission and has highlighted the

widespread diversity in empirical results on the subject. Such diversity attests partly to the inaccuracy of the underlying theory and to the difficulty in creating a credible research design, and partly to the wide range of responses that changes in interest rate policy elicit from households and corporations under varying circumstances and in various contexts. Not less important is the issue of the zero lower bound, largely set aside in the prior analysis, which limits the central bank's attempt to provide monetary policy stimulus via interest rate policy, as was the experience of the post-2008 recession years.⁹⁶

In section 2.4 we discussed the additional policies to which the Federal Reserve turned initially alongside interest rate policy and eventually as an alternative, once interest rates reached the zero lower bound (Bernanke, 2012), classifying them into two categories, namely quasi-debt management and credit policy, along the Borio and Disyatat (2009) taxonomy (see section 2.4). Both categories of policies, jointly referred to as balance sheet policies because of their impact on the size and/or composition of the central bank's balance sheet, were implemented partly with the aim of providing additional stimulus to an economy that remained in recession despite record-low interest rates, and involved the purchase of assets in both the market for government securities and in private credit markets. While the nature of balance sheet policies is neither unconventional nor unorthodox, as argued previously, the scope with which they were implemented justifies characterization of both as experimental. Specifically, both policies were implemented for the purpose of impacting asset prices and credit availability in the government debt and private credit markets, with the ultimate purpose of stimulating weak aggregate demand, predominantly via balance sheet channels (alternatively referred to as asset price channels) discussed in the subsequent sections.

Monetary policy affects the economy via balance sheet channels by changing financial asset prices on the balance sheets of the corporate and household sectors, thus impacting corporations' (including non-bank financial institutions) and households' ability to attract capital and to borrow, as well as their willingness to invest and consume, theoretically stimulating aggregate demand. We proceed with our analysis as follows. In section 3.2.1 we examine the theoretical and empirical evidence on the transmission channels through which monetary policy is presumed to impact asset prices, uncovering some surprising findings that conflict with mainstream theoretical assumptions. In section 3.2.2 we consider the transmission channels through which changes in asset prices are presumed to impact

⁹⁶ For a consideration of negative interest rate policy see section 4.4.

aggregate demand, thus continuing our investigation into and assessment of the effectiveness of monetary policy in promoting a sustainable recovery in aggregate output in a post-crisis period.

3.2.1 BALANCE SHEET POLICY'S IMPACT ON ASSET PRICES

Quasi-debt management and credit policy is presumed to influence asset prices via three main channels: the interest rate channel, the portfolio rebalancing channel, and the scarcity channel.⁹⁷ The impact of monetary policy on Treasury yields and prices, which are inversely related to each other, has already been considered in the context of the *term premium and corporate borrowing* interest rate channel and therefore we recall just the conclusions of the analysis briefly. While there appears to be some evidence of effects on asset prices via the interest rate channel, specifically, that the Fed's LSAP programme was successful to some degree in lowering the term premium (thus raising asset prices), such changes appear to be temporary, reversing after one year (Hanson & Stein, 2015, p. 447) and suffering from a diminishing returns effect linked to temporary financial constraints (Stein, 2012, p. 9). More generally, empirical evidence on the subject reflects a significant degree of uncertainty and sensitivity to the chosen methodology and data series, while research analysing changes in corporate yields as a result of LSAPs is limited and focuses mainly on short-term movements in yields in response to monetary policy announcements.

Although the effects of monetary policy on asset prices via the interest rate channel are indirect, owing to changes in the term premium that itself eludes precise estimation (Kim & Orphanides, 2007, p. 38), the financial sector portfolio rebalancing and scarcity channels consider the more direct impact of central bank asset purchases on the price of Treasuries, corporate bonds, collateralized structured products and equities via changes in supply and demand for those assets. The theoretical underpinnings of the portfolio rebalancing channel in this section are somewhat different from those discussed previously in relation to intertemporal substitution, as portfolio rebalancing in this context relates to financial players' balance sheet decision making rather than to changes in household savings and consumption. Specifically, the existence of this channel presumes that, as the central bank purchases Treasury securities from institutional investors and financial players, the sellers' cash balances increase and the additional liquidity induces them to invest in other assets (assuming

⁹⁷ The effects of monetary policy on asset prices via the liquidity channel (Gagnon et al., 2010, p. 6) are not considered in this discussion as this channel was of importance predominantly during the crisis rather than in the post-crisis period relevant to the ongoing analysis.

imperfect substitutability between money and assets), such as corporate bonds and stocks, increasing the prices of these assets and lowering yields (Bernanke, 2012).

From a theoretical point of view, a number of criticisms has been brought against this idea of portfolio rebalancing in the context of quasi-debt management policy vis-à-vis the financial sector. Most important is the argument that central bank purchases of Treasury securities (government liabilities) in exchange for reserves (central bank liabilities) is simply an exchange of one type of liability for another, relatively similar liability (the argument of similarity being particularly applicable to reserves on which the central bank pays interest, as in the case of the United States since 2008). Williamson (2011, p. 66) argues that the private financial sector is sufficiently effective in fulfilling the role of liability transformation without central bank intervention,⁹⁸ while Borio and Disyatat (2009, p. 13) contend that “[g]iven the close substitutability between central bank and government liabilities, the portfolio balance effect may not be that large”. Stated differently, the Fed’s purchase of Treasury securities may have simply offered counterparties willing to engage in this exchange an alternative method of liquidity management, without any evident effect on demand for other classes of financial assets.

Although the prices of Treasuries appear to have benefitted from upward pressure owing to a decrease in supply and an increase in demand for this ‘safe haven’ asset class⁹⁹ (Krishnamurthy & Vissing-Jorgensen, 2013, p. 79), there is no convincing theoretical or empirical evidence of positive spill-over effects into private credit markets via this channel (*ibid.*, pp. 58-59; Reza et al., 2015, p. 5). On the contrary, it is likely that the Fed’s LSAPs, by removing a significant amount of Treasury securities from the market, have had negative, rather than positive, liquidity effects in non-Treasury markets, as Treasury securities are the primary form of collateral used in liquidity transformation operations by financial players (Gagnon et al., 2010, p. 11; Williamson, 2011, p. 66; Singh & Stella, 2012, p. 16; Reza et al., 2015, p. 11).

Whereas the purchase of Treasuries implies an ‘illiquidity effect’ in private credit markets, working contrary to the purpose of the Fed’s securities purchase programmes by tampering liquidity creation and demand for non-Treasury assets, central bank purchases in the MBS market appear to have led to a degree of price appreciation in this sector of the

⁹⁸ Private financial sector institutions create special purpose vehicles to hold Treasuries, using them as collateral in repo transactions to be rolled over daily, creating the necessary liquidity akin to central bank reserves.

⁹⁹ Support for this view requires acceptance of the maturity-preference or market segmentation theory, as in the absence of the related assumptions Fed purchases of longer-term Treasuries would do little to impact their prices, since investors would simply shift into other segments of the maturity spectrum. Evidence that Treasury securities and high-quality corporate bonds are not substitutes is provided by Joyce et al. (2011).

securities market, an effect captured by the so-called *scarcity channel*. The most important contribution to the theoretical and empirical literature on the scarcity channel is provided by Krishnamurthy and Vissing-Jorgensen (2013), who document a narrow channel of influence, with purchases of mortgage-backed securities leading to a general increase in MBS prices, with no spill-over effects into other asset classes. The effectiveness of the scarcity channel in the MBS market is linked to specific characteristics of these products, particularly to the heterogeneity of mortgage-backed securities, predominance of trading in the ‘to-be-announced’ market and the ‘cheapest to deliver’ option, giving the seller in the contract the possibility of delivering the cheapest from amongst the eligible securities.¹⁰⁰ Both the theoretical and the empirical evidence provided by the authors is persuasive, but, as the authors themselves point out, the MBS price increases that occur via the scarcity channel are by definition temporary; as the Fed tapers purchase, the scarcity premium will gradually and completely disappear (p. 61).

Having considered the impact of monetary policy on public and private securities, we move on to a brief consideration of the impact of the Fed’s asset purchases on the stock market, which plays a part in the theoretical transmission of monetary policy to consumption and investment, as discussed in the subsequent section. Although increasing equity values are presumed to be an important factor in the mechanism via which monetary policy impacts aggregate demand along the three channels discussed below, there appears to be scant understanding of and insufficient literature examining how, precisely, central bank policy moves equity prices. Predominantly, earlier theoretical consideration of the subject revolved around the so-called *liquidity shock hypothesis*, which suggests that a fall in equity prices in economically unfavourable times creates collateral constraints for new debt issues and limits the ability of entrepreneurs to attract new equity to fund promising investment opportunities, thus suppressing aggregate output (Kiyotaki & Moore, 2012, pp. 5-7). In this model, the central bank is perceived to play a possibly crucial role, easing credit conditions (or, potentially, buying relatively illiquid equity to hold on its balance sheet), thus increasing stock prices, improving liquidity of traded equity and stimulating corporate investment (*ibid.*, pp. 7-8).

Although the Federal Reserve has not directly acquired equity under any of its programmes, there are a number of channels via which the Fed’s policies may have contributed to an increase in demand for the stock of private companies, rendering the prior

¹⁰⁰ See Krishnamurthy and Vissing-Jorgensen (2013, pp. 67-69) for a detailed discussion of these characteristics.

analysis a useful consideration. First, the prolonged period of low interest rates has created investment dynamics described by the *risk-taking channel* (discussed in the subsequent chapter) as well as the *equity financing channel* of interest rate policy, which have resulted in an upward pressure on equity prices. Additionally, while direct portfolio rebalancing effects as a result of central bank purchases of Treasury securities appear minimal, as discussed above, such effects may have been more pronounced as a result of the greatly expanded list of collateral that the Federal Reserve has taken on its balance sheet in lending operations, as well as the expanded list of eligible counterparties to such operations (Federal Reserve Board, 2009; Federal Reserve Bank of New York, 2016b), easing liquidity conditions in private credit markets and encouraging greater investment in the stock market.

In consideration of the central bank's effort to support asset prices by easing credit conditions facing corporations with publicly traded equity, it is informative to consider the findings of Araújo et al. (2013, p. 3), who point out that the outcomes of such efforts "depend critically upon the way in which and degree to which collateral constraints bind". Specifically, central bank asset purchases may have varying aggregate effects in alternative circumstances and scenarios. In this analysis, it is therefore critical to consider that monetary policy acts to influence asset markets via multiple channels, including the generally positive impact on equity prices of interest rate channels discussed previously and the impact on expectations, a subject revisited briefly in section 4.6.

On the whole, theoretical and empirical research on this subject has yet to offer a consensus view on the precise nature of the influence of central bank asset purchases and expanded liquidity provision efforts on equity pricing, or a definitive evaluation of the forces driving the equity price boom that has characterized the post-crisis period of otherwise unimpressive economic growth (Giles & MacKenzie, 2014 and Exhibit 10). One point on which academic and practitioner opinion has reached a consensus, however, and as clearly stated by the Governor of the Bank of England Mark Carney in a speech delivered at the eighth annual G20 Conference of the Institute of International Finance in Shanghai, monetary policy-induced changes in equity prices are, at best, temporary in nature: "unless an improvement in fundamentals boosts the underlying cash flows of these assets, real valuations will fall back" (Carney, 2016, p. 13).

On this note, we proceed to analyse the effects of central bank balance sheet policies on aggregate demand in the context of the above conclusions, specifically, that central bank purchases of private assets, as well as its efforts to ease funding conditions in a number of

private credit markets,¹⁰¹ have succeeded in raising the prices of public and private debt securities, as well as publicly traded stock, temporarily. We consider two channels through which balance sheet policy is hypothesized to influence aggregate demand, namely, the *equity financing* channel and the *real estate collateral* channel, questioning whether the benefits of balance sheet policies are sufficiently evident and significant to justify the costs of such policy and the yet-uncertain risks that central bank intervention in the asset markets creates (Basel Committee on Banking Supervision, 2012, pp. 16-22).

3.2.2 BALANCE SHEET POLICY'S IMPACT ON AGGREGATE DEMAND

(11) *Equity financing channel of balance sheet policy*¹⁰²

One of the mechanisms through which balance sheet policy is presumed to impact aggregate demand involves hypothetically increased access to equity financing for the corporate sector as a result of higher asset prices, a positive change in balance sheet positions that augments investment potential (Reza et al., 2015, p. 2). Our analysis of this mechanism is simplified significantly by our prior consideration of several related interest rate channels. In examining the effect of lower short- and long-term interest rates, as well as increased cash flow, on corporate equity issuance, borrowing and investment, we drew a number of conclusions that are crucial for an effective evaluation of the *equity financing* channel. The relevant concluding arguments are as follows.

- (1) Corporate investment decision making depends on a subjective evaluation of future economic prospects and is subject to irrationality.
- (2) Evaluation of future effective demand is frequently more important to corporate investment decisions than are cost factors.
- (3) The option to wait to invest increases in value for the corporate sector as economic uncertainty increases.
- (4) Large US corporations tend to fund new investment from retained earnings, rather than debt or equity financing.

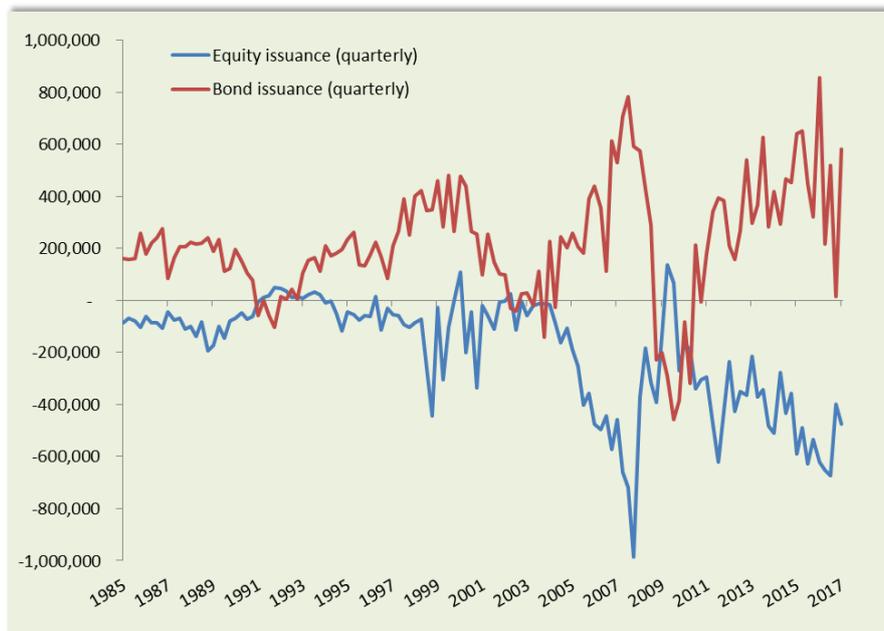
¹⁰¹ See Appendix A1 for a detailed description of the various programmes.

¹⁰² The equity financing channel of interest rate policy analysed previously represents a slightly different mechanism to that considered herein, with the former considering the impact on asset prices of low interest rate policy and the latter considering the potentially more direct impact of balance sheet policies on equity valuations.

- (5) US corporations have favoured redistribution of corporate profit rather than the issuance of additional equity in the period since the crisis (see Exhibits 6 and 7 and related discussions).
- (6) In light of economic uncertainty, firms tend to build up a stockpile of cash as a precautionary move, cutting investment (see Exhibit 8 and related discussion).
- (7) Once financial constraints no longer bind, monetary policy that aims to remove barriers to marginal financing is no longer effective (see Exhibits 8 and 11 and related discussion).
- (8) The use of monetary policy to influence stock prices leads to a (temporary) divergence of equity value from fundamentals, creating various macroeconomic imbalances (see Exhibits 9-11 and related discussion).

Not surprisingly, a look at the data on quarterly corporate debt and equity issuance since 1985 in Exhibit 18 illustrates the significant (by historical standards) downward trend in equity financing since the crisis, with only a brief spike in the data shortly after the crisis. Debt financing, on the contrary, has been used by US corporations intensely and appears as a near-perfect mirror image of the equity issuance trend line, thus suggesting that borrowing has been used to fund corporate redistribution (Palley, 2007, p. 19).

Exhibit 18 Corporate equity and debt issuance, \$ millions, 1985-2017.



Source: Author's elaboration on Federal Reserve Board financial accounts data (Z.1 Statistical Release liabilities flow data: nonfinancial corporate equities and nonfinancial corporate debt securities). Based on earlier analysis by Palley (2007, p. 19).

While research on the specific dynamics inherent to the interaction between balance sheet policies and equity financing and investment is scant, a number of recent contributions permit us to add several observations to the points listed above. In the aggregate, Shi and Tewfik's (2015) theoretical model shows that shocks to the liquidity of equity can have important negative effects on corporate investment, but confirms that such shocks cause a significant delay of investment by firms even in the context of improving conditions resulting from (hypothetical) government purchases of publicly traded equity (p. 157). Dissecting aggregate data, Covas and den Haan's (2011) empirical investigation on equity issuance patterns over the business cycle underscores the highly divergent behaviour of large versus small firms, with corporations in the top one percent issuing equity countercyclically in such an amount as to influence the aggregate data in some scenarios, obscuring the procyclical issuance behaviour of firms less significant in size (pp. 877-878). However, increases in assets are financed by equity issuance to an important degree only amongst firms in the first size quartile (the smallest firms), with the larger corporations depending to a greater degree on debt and internal finance (p. 893), in line with our prior discussion of Baker et al.'s (2002) findings on the behaviour of small, equity constrained companies.

Another interesting theoretical study by Shi (2015) points to an apparently counterintuitive dynamics, whereby at times of collateral constraints and general illiquidity in the stock markets the equity price of companies with attractive investment opportunities benefits from increasing liquidity and price appreciation (p. 118), a "puzzling" response documented by other recent research in the field.¹⁰³ The implications for (hypothetical) central bank equity purchases (the most direct method for the central bank to support asset prices) considered by the author under this scenario are also contrary to those suggested by the liquidity shock hypothesis, discussed previously, as his findings suggest that monetary intervention in the equity markets could actually exert downward pressure on the equity of firms with viable investment projects (p. 131). These conclusions are in line with the findings of Covas and den Haan (2011) that large corporations find it profitable to issue equity countercyclically, as investors are likely to favour large, well-established corporations over small, risky ones at times of weaker economic performance.

Overall, recent academic efforts to understand the link between monetary policy and asset prices have focused on defining the role of the central bank in preventing asset price bubbles and reducing the risks of repeat financial crises resulting from a build-up of financial

¹⁰³ A comprehensive review of related literature is presented by Shi (2015, pp. 118, 131-132).

imbalances (Borio, 2003 & 2011a; Gali & Gambetti, 2014). Theoretical and empirical consideration of balance sheet policy's impact on aggregate activity via the equity financing channel is scant. Perhaps this is a result of the negative sentiment that has evolved with regards to the impact of protracted low interest rate policy on equity prices, the financial imbalances that this policy is potentially creating and the increasing risks of a repeat financial crisis that it involves. Rising equity prices are consequently perceived as a 'side effect' of stimulative monetary policy, rather than a channel through which the central bank may aim to positively influence economic developments in the medium to long term.

It appears, nonetheless, that at times when liquidity constraints bind, central bank balance sheet policies that successfully support equity market prices can benefit the financial position of small, equity constrained firms, thus supporting investment activity in this portion of the corporate sector. However, such policy belongs to the central bank's policy kit use of which is appropriate during, or in the period immediately following, a financial crisis rather than as a medium- to long-term policy designed to encourage sustainable economic growth. Beyond this, central bank intervention to support prices of publicly traded equity risks divorcing prices from fundamentals and creating equity price bubbles that will eventually correct, creating important risks for financial stability.

(12) *Real estate collateral channel*

While in the absence of outright central bank intervention in equity markets the effects of balance sheet policies on stock market prices are merely indirect, the response of securities, including MBS products, to such policies is more direct and potentially more pronounced, as discussed previously. The *real estate collateral* channel of balance sheet policy considers the impact of rising securities and real estate prices on households' balance sheets and their consequent ability to obtain additional credit, and/or more favourable lending terms, to fund marginal investment and consumption, thus theoretically contributing to a recovery in aggregate demand. As the primary form of collateral used by households to fund additional borrowing for consumption and investment is real estate equity, we consider the link between monetary policy-induced increases in MBS (that is, falling MBS yields) and developments in the market for residential property.

As discussed previously, interest rate policy, through the *cost of real estate capital* channel, did not have a significant positive impact on household consumption in the years following the crisis, and, regardless, interest rate policy quickly ran out of steam as rates hit

the zero lower bound. The relevant question to examine, therefore, is whether the Fed's additional balance sheet policy that involved quantitatively significant purchases of mortgage backed securities, which successfully, though temporarily, lowered MBS yields, was also successful in transmitting the stimulus to households. Theoretically, lower yields in the MBS market should exert downward pressure on mortgage rates facing consumers, encouraging additional borrowing and investment in residential property, thus increasing real estate prices. The consequent rise in the value of home equity increases the value of real estate collateral available to existing property owners, who are able to pledge the new collateral value to increase borrowing (home equity withdrawal), investing in addition, or more expensive, property, or increasing consumption, and thus perpetuating the cycle of increasing investment and consumption (Mishkin, 2007, pp. 11-13; Boivin et al., 2010, pp. 21-22), albeit at the expense of increasing leverage in the housing market.

Unfortunately, empirical evidence undermines one of the foremost links of this theoretical formulation of monetary policy transmission. Studies suggest that the pass-through of lower interest rates from MBS securities to household mortgage products in recent years was hampered by a number of frictions, including mortgage market concentration (representing an important and increasing market power of lenders) (Scharfstein & Sunderam, 2013), the rise in origination costs and the accumulation of profit by mortgage originators (Fuster et al., 2013, p. 38), and continuing marginalization of highly indebted borrowers (Eggertsson & Krugman, 2012, pp. 1471-1472). Balance sheet policy's impact on mortgage rates at the level of individuals and households in the context of the post-2008 recovery is therefore highly questionable. Although empirical evidence discussed in the context of the cost of real estate capital channel suggests that, once the process of voluntary deleveraging by households was complete, house prices did indeed begin to rise, it appears that this dynamics is a result of a trend of easing lending standards rather than of the impact of lower mortgage rates facing consumers (Gelain et al., 2015, pp. 5-6).¹⁰⁴ As mentioned previously, deleveraging in the mortgage market has been pronounced and consistent, continuing into 2016 even as overall household debt levels, driven by increases in auto and student loan debt, have slowly begun to rise (see Exhibit 13 and related discussion).

Our hitherto analysis of the *real estate collateral* channel suggests that the primary beneficiaries of the direct effects of the central bank's purchases of MBS are loan originators, who profit from the increased spread between mortgage loans and MBS products, and

¹⁰⁴ The link between monetary policy and lending standards is considered in the context of the bank lending and risk-taking channels of monetary policy investigated in Chapter 4.

financial institutions whose balance sheet positions may improve as a result of the rise in prices of mortgage backed securities. There is, however, a notable absence of evidence to suggest that the central bank's purchase of MBS, which the Federal Reserve has continued beyond the immediate post-crisis period,¹⁰⁵ has had a direct impact on the costs of mortgages facing households, expanding demand for mortgages and home equity investment via this cost channel. Our analysis in this section also points to the importance of a systematic and sequential evaluation of each theoretical link in a given hypothetical transmission channel of monetary policy with no *a priori* assumptions of the effects of monetary policy on economic variables. The oft seen analysis of monetary policy that begins with an assumption of central bank-induced increases in real estate prices (as in Mishkin, 2007, p. 9; Boivin et al., 2010 p. 21) clearly leads to misleading conclusions and an incomplete understanding of the mechanisms of monetary policy transmission.

On the whole, our hitherto systematic analysis of the theory and empirical evidence of the existence and effectiveness of interest rate and balance sheet channels of monetary policy transmission has contrasted sharply, in both approach and results, with traditional neoclassical work on the subject matter. This chapter has therefore extended the theoretical work of the previous chapters, which presented a heterodox framework based principally on post-Keynesian theory. The chapter's findings have lent firm support to the hypothesis that monetary policy is by and large ineffective in the goal of stimulating consumption and investment, with policy transmission occurring in an imprecise and frequently unpredictable manner, reflecting the profound complexity of the underlying causal relationships and the recursive nature of economic growth determinants, as well as the inevitable costs involved in the prolonged use of monetary policy with the aim of stimulating an economy suffering from a persistent and severe aggregate demand generation problem.

¹⁰⁵ Continuation of central bank MBS purchases beyond 2010, when all other crisis measures were brought to a close, is illustrative of the fact that MBS purchases are viewed as a longer-term measure intended to impact aggregate activity over the course of a prolonged recession (see, for example, Bernanke 2012).

4 MONETARY POLICY TRANSMISSION: BANK LENDING, RISK-TAKING AND NEGATIVE INCOME CHANNELS

Since the financial crisis of 2008 and the ensuing Great Recession, the role that banks play in the transmission of monetary policy has gained unprecedented attention, as illustrated by the drastic revision of the analytical perspective in mainstream economic models to include the banking sector, hitherto neglected in the neoclassical framework for monetary analysis (see section 2.5.2). In fact, much of the Federal Reserve's post-crisis policy focused on the financial sector with one of the central objectives being to stimulating bank lending, a strategy based on the view that tight credit was deterring spending and investment, thus contributing to the weakness in economic growth since the crisis (Bernanke, 2012).

Heterodox economics theory, particularly post-Keynesian, preceded the mainstream in its inclusion of and emphasis on the importance of the banking sector to economic outcomes and the transmission of monetary policy (see section 2.5.3). Furthermore, as we will see in the ensuing discussion, post-Keynesian theory remains at odds with much of the mainstream perspective on the role of banks and on the mechanisms that determine the effects of changes in the monetary policy stance on both the financial sector and production activities. The following analysis does not question the success of the Federal Reserve in its role of lender of last resort in the immediate post-crisis period, when interbank markets froze and banks faced critical liquidity constraints (Carpenter et al., 2014). As in Chapter 3, the focus of the following discussion is on the subsequent phase of the recovery, which saw the restoration of generally unhampered trading in interbank markets and an unprecedented expansion of the Fed's balance sheet as a result of credit and quasi-debt management policies of extraordinary magnitude.

The years that followed these initial post-crisis developments were characterized by weak bank balance sheet growth, anaemic expansion in retail loans and increasing levels of risk on both the assets and liabilities side of banks' balance sheets, as illustrated by the empirical evidence we present in this chapter.¹⁰⁶ In order to shed light on the determinants of these trends and to understand how monetary policy interacted with the banking sector to influence lending and investment, we first undertake a theoretical investigation into the role of bank deposits and central bank reserves, the determinants of bank lending and the role of

¹⁰⁶ See also Federal Reserve Bank of Cleveland (2013); Bassett et al. (2014); Angeloni et al. (2015); Cissi (2015); Lutter & Terrazas (2015).

lending in economic outcomes. We then continue our theoretical and empirical investigation, commenced in Chapter 3, providing a comprehensive analysis of the theoretical bank lending channels, a group of potential transmission channels that encompasses all effects of changes in the stance of monetary policy on banks' balance sheets and, consequently, on their willingness and ability to lend to firms for production purposes. Furthermore, we consider the existence and importance of an income channel, largely neglected in existing theoretical and empirical literature, and briefly re-examine the expectations channel on the basis of the theoretical foundation sketched in section 2.6.3, providing further evidence as to why, despite its theoretical importance, it is not currently a central conduit of monetary policy.

4.1 COMMERCIAL BANKING IN THEORY AND PRACTICE

4.1.1 WHEN HETERODOX IN THEORY IS MAINSTREAM IN PRACTICE: MONEY CREATION AND THE ROLE OF DEPOSITS IN THE BANKING SECTOR

A central element of commercial banking theory on which post-Keynesians have distinguished themselves from the mainstream is the adoption of the 'credit expansion' (endogenous money) view of the banking system's role in the economy and the wholesale rejection of the 'intermediation' framework traditionally put forth by mainstream economists. The latter perspective, which was widely adopted in mainstream theoretical and empirical research before the crisis, is based on the presumption that banks are mere intermediaries which collect deposits and lend them out, thus acting as agents that re-distribute financial resources to their most effective uses. A related view, based on fractional reserve theory, uses a similar 'intermediary' definition of the individual bank, but admits the ability of the banking sector as a whole to create money, albeit within the limits of fractional reserve regulation imposed by the central bank (Werner, 2014b, p. 2). This framework relies on the erroneous money multiplier concept to explain broad money creation in the economy, whereby the central bank's provision of additional reserves to the banking sector leads to increased lending, thus stimulating economic growth and possibly exerting upward pressure on the rate of inflation, an idea that is fundamentally inadequate in the context of the endogenous money perspective (see sections 1.9 and 1.14) and the invalidity of which will become evident in the subsequent sections.

The crisis of 2008, which most NCM and New Keynesian models were unable to either predict or explain, highlighted the importance of the banking sector and the profound

inadequacy of a framework that either excludes banks entirely or depicts them in a limited role of intermediary (see section 2.5.1). What heterodox economists have known for centuries (Werner, 2014b, pp. 2-6; Lavoie, 2015, p. 7) was brought under the spotlight of monetary theory with an important contribution made by a number of central bank publications that offer a thorough, systematic presentation of the actual operations of the banking system in line with the credit expansion framework of banking theory (Keister & McAndrews, 2009; Carpenter & Demiralp, 2012; McLeay et al., 2014; Jakab & Kumhof, 2015).

Given the abundance of literature on the subject and related discussion of endogenous money theory presented in Chapter 1, the purpose of the subsequent sections is not to continue this debate but to use the credit expansion framework to sketch the mechanisms at work in the interaction between the Federal Reserve and the commercial banking sector, and between the commercial banking sector and firms as well as consumers. A thorough understanding of these mechanisms will allow us to proceed to the analysis of a number of theoretical formulations of bank lending channels and to draw conclusions on the potential for monetary policy to stimulate economic growth via the banking sector.

An exposition of these mechanisms inevitably begins with a presentation of the banking sector's role in the process of demand-driven broad money creation,¹⁰⁷ which occurs as commercial banks extend loans to the non-financial sector, booking simultaneously an asset (new loan) and liability (new deposit) on their balance sheets. US commercial banks differ from corporations and non-financial institutions in this accounting process of loan extension, which results in the 'commingling' of client deposits with the bank's other liabilities (Corrigan, 1982), while the latter, in the process of extending a loan, decrease an asset such as a cash holding or a deposit at a bank, rather than create an additional liability, a process described in detail by Werner (2014a, pp. 72-75). Hence, an individual holding a deposit with a US bank as a result of the newly-issued loan temporarily becomes the bank's creditor (albeit with the special privilege of insurance deposit offered by the Federal Deposit Insurance Corporation), until the deposit is withdrawn and the relationship between the issuing bank and its customer is terminated.

Broad money is thus created by the banking sector via the issuance of new loans and is destroyed when borrowers repay those loans, an action that is reflected on the lending bank's balance sheet as a cancellation of a loan entry and a decrease in deposits (assuming,

¹⁰⁷ The process is demand driven in this context in that the amount of broad money responds to the needs of the economy via the process of simultaneous loan extension and deposit creation, rather than being dictated by operating procedures of the central bank (see section 2.3 and Butt et al., 2014, p. 37 for a discussion of the endogenous, demand-driven process of money creation).

for simplicity, that the deposit used for repayment has been accumulated at the same bank which originally issued the loan). As highlighted by McLeay et al. (2014), broad money is also destroyed by a number of actions initiated by the banking sector itself. Specifically, money is destroyed when banks sell assets (such as Treasury securities) to the non-bank sector, an action that decreases the deposit balance at the bank of the counterparty purchasing the asset and increases the reserve balance of the selling bank with no corresponding deposit created elsewhere. Furthermore, a shift in the liabilities structure of the bank (such as the issuance of additional long-term debt or equity) reduces the amount of short-term liabilities (deposits) in the bank's funding structure, hence reducing the aggregate quantity of broad money. The latter action results in a gap between the quantity of deposits and the quantity of loans, since in this scenario deposits are destroyed without a corresponding reduction in loans (p. 17). Aside from the repayment of debt by households and corporations, the issuance of bank debt or equity and the transfer of assets from the bank to the non-bank sector, there is nothing banks as a group can do to decrease the aggregate quantity of deposits (Disyatat, 2010, p. 7, footnote 3).

The central bank's influence on the quantity of banks deposits occurs predominantly via its purchase (sale) of assets from the non-bank private sector, which, much as in the case of similar activity by commercial banks, acts to increase (decrease) a deposit at the intermediary bank while decreasing (increasing) the quantity of assets held by the private sector. The erroneous presumption, based on the theory of portfolio rebalancing, that the central bank may influence the quantity of deposits via changes in the policy rate of interest has been criticized in the context of the interest rate and balance sheet channels of monetary policy transmission (see sections 3.1.2 and 3.2.1). Furthermore, in recent years, transaction deposits have paid virtually no interest and are, by logical reasoning, not interest sensitive but rather are held for the purpose of convenience (Disyatat, 2010, p. 7).

Notably, the central bank's attempt to influence the quantity of bank deposits in a mechanical way by purchasing assets from the non-bank private sector (the foundation for traditional bank lending channel theories considered hereafter) is futile in the context of private sector deleveraging, a trend characteristic of a post-financial-crisis period (see sections 1.6, 3.1.1 and 3.1.2), as the private sector uses the newly-created deposits to pay down outstanding debt, destroying deposits in the process. In fact, such operations merely result in an increase in reserve balances, since, in exchange for the asset, the central bank credits the intermediary bank with reserves, and the intermediary bank books a corresponding deposit to the account of the individual or corporation selling the asset. The deposit is

subsequently used to repay the loan (disappearing along with the loan from the aggregate balance sheet of the banking sector) while the newly-created reserve balance remains (Lavoie, 2015, pp. 12-13).

Such central bank asset-purchase operations represent the (albeit imprecise and partial) supply-determined element of the aggregate deposit-creation process, as argued by a number of authors within the context of the credit expansion framework (Keister & McAndrews, 2009, p. 6; McLeay et al., 2014, p. 24). However, this perspective appears questionable when one considers the voluntary nature of all transactions between the central bank and the private sector, with the latter's willingness to sell assets a reflection of its preference for liquidity and, hence, is arguably best defined as a demand-driven process not unlike that of demand-driven loan and deposit creation described earlier. An illustration of the importance of private sector demand in determining a central bank's ability to carry out bond-buying programmes is provided by the experience of the BoE in the summer of 2016. The Bank's August gilt purchase programme was hampered by investors' unwillingness to sell gilts (in spite of the above-market offer price) with the programme falling short of its £1.17 billion gilt purchase target (Cumbo & Moore, 2016). Thus, in the absence of private sector demand for liquidity, the central bank may find its potential to increase the aggregate quantity of deposits within the banking sector significantly curtailed.

4.1.2 THE ROLE OF RESERVES AND IMPLICATIONS OF THE "DECOUPLING PRINCIPLE"

Much as the quantity of deposits on the aggregate balance sheet of the banking sector is determined by demand from non-bank institutions, corporations and the household sector, the quantity of reserves under the current operating framework of the Federal Reserve is determined by demand from the banking sector. For banks, reserves are the means of final interbank payment, much like deposits are the means of final payment for the non-bank financial sector, corporations and households (see section 2.3).

The "decoupling principle" (Borio & Disyatat, 2009, p. 1), which applies to a monetary framework such as that currently in operation in the United States, where the remuneration of excess reserves insures a disconnect between the policy rate of interest and the total reserve quantity, describes a monetary system where the central bank supplies reserves on demand and without an operational limit. By paying interest on excess reserve balances at the targeted rate, the Fed is able to equate the opportunity cost of holding reserves to zero, eliminating the incentive for interbank lending to occur below this rate, thus

rendering the policy rate of interest independent from the quantity of reserves in the system above a certain threshold, as described earlier (see section 2.3). In this framework, and assuming normal market conditions, the (minimum) quantity of reserves is thus demand determined (Disyatat, 2010, p. 5), reflecting the aggregate banking sector's liquidity preference, which in turn is shaped by banks' daily liquidity management activities and the desired liquidity cushion held against uncertainty.

While the Fed will in all circumstances accommodate the demand for reserves by the banking sector (failure to do so would result in extreme volatility of interbank market rates), the aggregate quantity of excess reserves may exceed the quantity demanded by the banking sector as a result of central bank asset purchases from the private sector (recalling the scenario where a reserve and simultaneous deposit are initially created at a bank intermediating a central bank's asset purchase from the private sector). As excess reserves are remunerated, the central bank is able to force more reserves into the system than banks demand, with no effect on the interest rate (Lavoie, 2015, p. 11). Furthermore, it is sometimes argued that central bank asset purchases from the banking sector directly result in a supply-determined quantity of excess reserves (Keister & McAndrews, 2009, pp. 7-10), but, as in the previous discussion on the determinants of the quantity of bank deposits, this view is questionable, since participation in credit programmes is voluntary on the part of banks, and reflects their preference for greater liquidity on the assets side of the balance sheet. Regardless, and under either scenario, the banking sector can do nothing in the aggregate to decrease total reserves, the precise quantity of which will also be influenced by how the central bank chooses to fund its asset purchase programme¹⁰⁸ (Bean, 2009, p. 2; Lavoie, 2015, p. 13).

The implications of the above discussion also extend to the issue of quasi-debt management and credit policy's influence on bank lending, a central theme of the analysis that follows. While a methodical analysis of various bank lending channels of monetary policy is reserved for section 4.2, it is crucial to note at this stage that it is a widespread misconception that Federal Reserve quasi-debt management and credit policies, beyond those implemented in the immediate aftermath of the crisis (in the category of 'short-term crisis measures' listed in Table 1 of the Appendix), aimed to expand the quantity of reserves so as

¹⁰⁸ A detailed description of the alternative methods for the central bank to fund asset purchases (the creation of new reserves versus the sale of Treasury securities by the government, which increases the governments reserve balance at the central bank) is clearly described by Lavoie (2010, pp. 8-9).

to stimulate bank lending.¹⁰⁹ Quite on the contrary, expanding reserves were a by-product, rather than the objective, of these programmes, which instead aimed to influence economic activity via asset price, interest rate and balance sheet channels, all of which have been discussed in Chapter 3 (Bean, 2009, p. 2; Keister & McAndrews, 2009; Lavoie, 2010, p. 16; see also the stated aim of programmes listed in Table 1 of the Appendix).

It is a logical consequence of the operational reality of the US monetary system described herein that the aggregate quantity of reserves in no way limits commercial banks' *ability* to expand loan volume (McLeay et al., 2014, p. 16), since reserves are provided on demand by the central bank via the discount window in cases where banks are unable to secure the necessary liquidity in the interbank market (generally a preferred source of daily funds for banks). Furthermore, as we will see shortly, banks make lending decisions based on calculations of profitability and source the necessary reserves afterwards.¹¹⁰ These unequivocal observations of the workings of the monetary system provide a further illustration of the fictitious dynamics sketched by the money multiplier concept, which assumes that bank lending is dependent on an initial injection of base money, to wit, reserves (see section 1.14).

In fact, as underscored by Jakab and Kumhof (2015, p. 5), banks do not 'lend out' reserves, as reserves technically cannot be transferred to non-banks.¹¹¹ Furthermore, as mentioned previously, banks as a rule do not depend on the central bank for daily liquidity management and generally avoid accessing the discount window, preferring to source the necessary liquidity from interbank markets. The importance of interbank lending is discussed by Keister and Andrews (2009), who describe and illustrate via stylized bank balance sheets how borrowing in the interbank market fills in the shortfall in deposits and capital funding on the liabilities side of banks' balance sheets, permitting them to maintain the desired level of lending. Under normal capital market conditions, excess reserves are simply transferred from a bank with fewer lending opportunities (and more liquidity than it wishes to hold) to the bank with a greater number of lending opportunities than its existing liquidity position would otherwise allow it to realize (Keister & Andrews, 2009, pp. 2-3).

¹⁰⁹ Central bank intervention as lender of last resort may, indeed, be a necessary short-term crisis measure aimed at filling the interbank lending gap when interbank market liquidity dries up, so as to permit banks to maintain the desired level of lending (see discussion in Keister & McAndrews, 2009, p. 3).

¹¹⁰ See Jakab and Kumhof (2015, p. 13) for an ample literature review supporting this statement.

¹¹¹ The mistaken view that banks can 'lend out' reserves is pervasive, appearing in the analytical frameworks of academics and policymakers of the highest calibre (see, for example, comments by Veldkamp, 2016). Unfortunately, this view continues to appear even in post-Keynesian models otherwise supporting the endogenous credit-creation view (see, for example, Van der Hoog & Dawid (2015, p. 24)).

4.1.3 DETERMINANTS OF BANK LENDING: ABILITY VERSUS WILLINGNESS

Consideration of the determinants of bank lending is particularly important in the context of the endogenous money framework, where bank lending leads to the creation of broad money necessary as a means of final payment, and where banks play a key role in the validation of aggregate demand by their willingness, or unwillingness, to extend loans or roll over liabilities (see sections 1.6 and 1.14). We separate our discussion of the determinants of lending by considering first the capacity and subsequently the willingness (inevitably based on an evaluation of profitability) of banks to extend credit to their customers, briefly covering the types and the nature of risks banks must manage in carrying out this business activity.

In evaluating banks' capacity to provide loans, the fundamental point to expound is that, when interbank markets function smoothly, banks *as a group* are not constrained in their ability to source short-term funding (much less deposits, which are endogenously created) in the extension of loans, but may be constrained by the inability to raise adequate amounts of equity capital to pursue all profitable lending opportunities; however, the latter constraint must be distinguished from factors shaping *individual* banks' lending decisions, as they incorporate risk management considerations in deciding on the make-up of their loan portfolios, including their size and duration.¹¹²

The risks an *individual* bank considers in the course of its business activities fall into one of three categories, namely, credit risk, liquidity risk and insolvency risk (Farag et al., 2013, pp. 202-207). *Credit risk* refers to the risk of debtors' default on existing loans, which wipes out the corresponding amount of assets and capital from the lending bank's balance sheet, and in the extreme scenario can lead to insolvency, whereby the bank runs down its entire stock of capital; *insolvency risk* is thus determined by the structure of the bank's balance sheet (the size of the capital buffer it holds) and the overall riskiness of its loan portfolio. An *individual* bank's *funding liquidity risk* profile can be gauged by considering the amount of liquidity (or collateral needed to obtain liquidity) held by the bank for the purpose of managing the redemption of liabilities (including predictable outflows with defined maturities as well as the less predictable redemptions, such as the withdrawal of bank deposits). However, the type of funding liquidity risk that applies to an individual bank does not apply to the banking sector as a whole under normal market conditions if the central bank fulfils effectively its role of daily reserve management (see sections 2.3 and 4.1.2).

¹¹² Since monetary policy, in the normal course of business, affects the banking sector as a whole and does not aim to impact the balance sheets of individual banks, it is necessary to distinguish between lending considerations facing banks as a group from those facing individual banks with specific characteristics.

In sum, when interbank lending markets function normally, *funding liquidity risk* is bank specific and does not create any malfunctioning of the aggregate banking sector. *Credit risk* is likewise bank specific but may also become a systemic problem, when the lending behaviour of banks shifts the aggregate bank balance sheet towards excessively high levels of risky lending. Monetary policy's impact on the aggregate lending behaviour of banks (via the assets side of the banking sector's balance sheet) is thus an important consideration in the discussion of monetary policy transmission channels undertaken hereafter. Finally, *insolvency risk* is also bank specific, but becomes a risk to aggregate financial stability when a systemically important bank's insolvency threatens to destabilize the entire financial system, such as in the case of the failure of Lehman Brothers and the subsequent financial crisis of 2008. Furthermore, empirical research has documented that low policy rates of interest shift banks' funding structure towards a greater reliance on deposits at the expense of bank capital (Angeloni et al., 2015), a problematic monetary policy-induced dynamics that is described by the risk-taking channel (effective via the liabilities side of the banking sector's balance sheet) discussed in section 4.3.2.

A related line of argumentation is presented by Song Shin (2015), who contends that bank capital plays a fundamental role in supporting the credit expansion function of the banking sector, as banks with a small equity cushion may be limited in their ability to secure borrowed funds and thus to manage liquidity and solvency risk, ultimately lending less than what opportunities would permit. As a result, the author concludes that "well capitalized banks are a matter of effective monetary policy, not just the prudential regulation of banks", since the amount of capital needed to lend to all credible borrowers is much higher than what is needed to maintain solvency (p. 7). While the view that the effect of monetary policy on the capital structure of banks should be an important consideration for policy makers is perfectly valid, there are a number of problems with how the author arrives at this conclusion.¹¹³ First, as argued previously, banks are highly efficient in the transformation of illiquid claims into liquid assets via securitization and collateralization under normal market conditions (see section 2.6.4). Second, banks always have the (second-best) option of turning to the discount window to secure short-term borrowing. Furthermore, in a competitive banking sector, a profitable lending opportunity foregone by an individual bank will be eagerly capitalized on by a competitor. In the normal course of business, therefore, the granting of a *marginal* loan is a business decision based on the above-mentioned risk

¹¹³ Song Shin's (2015) view is ultimately based on the loanable funds perspective of bank lending. He argues indeed that "[a]s the bank borrows in order to lend, its access to funding is crucial for lending" (p. 4).

management considerations, including the consideration of the insolvency risk in the context of the existing capital structure of an *individual* bank, and motivated, as we will argue shortly, by profitability.

In the aggregate, regulatory capital constraints may indeed stall the expansion of credit and represent the only exogenous constraint on the creation of money by the banking sector. By contrast, the aggregate banking sector faces no endogenous binding limits on credit extension, as this activity is ultimately a business decision that involves the balancing of risk versus profitability. The endogenous factors that ultimately determine (and possibly limit) an *individual* bank's ability to expand its loan book, including its access to liquidity in the interbank market and the ability to hold on to, or attract, new deposits, are not applicable to the aggregate banking sector, which, as illustrated previously, has unlimited access to reserves and is the driving force behind deposit creation.

From the above analysis it emerges that monetary policy has no role to play in influencing banks' *ability* to grant credit, beyond the central bank's mandatory responsibility of daily liquidity provider (see section 2.3), leaving aside, temporarily, the role of macroprudential regulation (see section 5.4). We will reinforce this perspective in the ensuing analysis of bank lending channels of monetary policy transmission.

Although we argue that the aggregate banking sector, assuming a sufficient equity capital buffer, is unconstrained in its ability to fulfil demand for credit by creditworthy borrowers, it is clear that such a scenario is not always realized, as banks may be unwilling to grant the quantity of loans necessary to meet all existing demand. Determinants of banks' *willingness* to grant credit are generally rooted in banks' quantitative estimation of profitability associated with making a marginal loan, although a number of intangible factors are also at play, including banks' appetite for risk, their level of optimism in the evaluation of future economic prospects, and confidence in own ability to accurately assess risk of marginal lending.

In a stylized representation, a bank's business model involves borrowing short and lending long, with the level of the short-term interest rate and the steepness of the yield curve acting as important determinants of profitability (Adrian & Shin, 2009, p. 6). Since the spread between the interest rate the bank is able to charge on its assets and the rate of interest it must pay on its liabilities determines revenue, the bank must balance between cheaper, albeit potentially less stable, short-term liabilities and the more expensive, but stable, long-term bank debt and equity capital (Angeloni et al., 2015, p. 286). Although, as explained earlier, a

bank is not limited in its ability to provide a marginal loan,¹¹⁴ which results in the simultaneous creation of a deposit, in order to attract a marginal borrower a bank may have to decrease the interest rate it offers on credit thus squeezing its profit, and may subsequently ‘lose’ the deposit it created on its balance sheet as the customer withdraws the borrowed funds (McLeay et al., 2014, p. 18). Again, what is true for an individual bank does not hold for the system as a whole. Hence, if willingness to lend of the aggregate banking sector increases, usually owing to changes in the intangible factors mentioned earlier, ability to lend profitably may also increase, as deposits withdrawn from one bank are placed with another, increasing the latter’s deposit funding position (*ibid.*, pp. 19-20).

In a stylized representation of monetary policy’s impact on banks’ willingness to lend, the lowering of the policy rate of interest, which determines the marginal cost of funding for banks and which sets the hurdle rate for the return on loans, increases the profitability of all marginal loans of a given credit quality, inducing banks to expand lending (Martin et al., 2011, p. 2). However, such a simplified depiction of the monetary policy transmission mechanism is highly inadequate for a complete evaluation of the impact of post-crisis central bank policy on economic outcomes via bank lending channels, highlighting the limit of an excessive focus on simplified profitability equations in a description of bank lending behaviour.

First, in the post-crisis era, the policy rate of interest quickly reached the zero lower bound, precluding any further reliance on this mechanism to support bank lending profitability.¹¹⁵ Furthermore, in the United States, the Federal Reserve’s shift to quasi-debt management and credit policy, which aimed, and likely succeeded, in lowering long-term interest rates temporarily (see section 3.1.1), is likely to have negatively influenced banks’ evaluation of lending profitability. Additionally, empirical evidence provided by Martin et al. (2011) suggests the existence of cost frictions, generally neglected in the simplified representation of bank profitability calculations. Specifically, the authors find that, as the total quantity of reserves in the banking system increases as a result of credit and quasi-debt management policies, banks’ capital ratios deteriorate, forcing the banks either to raise more equity capital or to shrink loan portfolios, thus negatively impacting loan supply in the economy (p. 2). Finally, evidence from the post-2008 crisis period suggests that the impact of prolonged low interest rate monetary policy on banks’ perception and willingness to take risk

¹¹⁴ We set aside, momentarily, the bank’s risk management considerations.

¹¹⁵ For a consideration of negative interest rate policy see section 4.4.

has not been insignificant, reflected in possibly problematic dynamics on both the assets and the liabilities side of banks' balance sheets, and is considered shortly in the context of the risk-taking channels of monetary policy transmission.

4.1.4 THE ROLE OF BANK LENDING IN ECONOMIC OUTCOMES

The prior exposition of the roles of central bank reserves and deposits in the banking sector has been instrumental in illustrating that a 'large' quantity of reserves on the aggregate bank balance sheet is not indicative of banks hoarding liquidity rather than lending, and that a 'lack' of deposits does not constrain bank lending activity. Nonetheless, bank lending and the corresponding endogenous money creation is undoubtedly an activity fundamental to growth in economic activity, and is the essence of monetary non-neutrality in the post-Keynesian theoretical framework of a monetary production economy (see section 1.2). Empirical evidence supports the view that disruptions in credit supply have a significantly negative effect on produced output (Bassett et al., 2014, p. 24), and it is on the basis of this concern that overwhelming expectations have been placed on monetary policy's presumed capacity to stimulate bank lending, thus augmenting the pace of the disappointing post-crisis recovery. While it appears "well-known that monetary policy affects the supply of bank credit", as stated by the Basel Committee on Banking Supervision (2012, p. 3), no coherent or convincing theoretical and empirical evidence demonstrating the mechanisms by which monetary policy may stimulate economic growth via the banking sector has been presented so far to the best of our knowledge.

As we examine each theoretical bank lending transmission mechanism in turn in search of such evidence, it is critical to remember that the link between the growth of credit (that is, broad money) and growth of produced output is complicated by the several uses to which newly-granted credit may be put. As an alternative to investment by firms in production, new loans may be used to repay existing loans, simultaneously destroying the newly-created money with no impact on economic growth. Furthermore, newly-created money may be used for consumption or financial transactions and speculation, with both uses holding potentially negative implications for economic growth.

As explained by Werner (2014a, p. 76), credit expansion funding consumption may put upward pressure on consumer prices with no positive impact on growth dynamics, while "bank credit creation for financial transactions affects asset prices and is in the aggregate unsustainable", a conclusion similar to the one reached by Bhuduri et al. (2006), who

illustrate why the trend of rising virtual wealth and increasing consumption/investment is bound to reverse. Specifically,

“[B]ecause virtual wealth by its very logic is not realizable in most part, the higher consumption (or investment) expenditure is financed mostly by borrowing from the banks and related financial institutions in an ‘overdraft’ economy. While they accept the virtual wealth as the collateral for lending, debt and repayment obligations are incurred by the private holders of the virtual wealth. If the debt to income ratio of the private sector mounts in this process, their creditworthiness tends to erode” (p. 426).

Similar to Minsky’s instability hypothesis (see sections 1.6 and 5.2.3), the framework sketched by Bhuduri et al. (2006) suggests an eventual reversal of this process as the debt burden reaches unsustainable levels and the economy is forced to shrink. Hence, credit expansion that results in overinvestment in the financial sector not only is ineffective in creating sustainable growth dynamics but may actually create destabilizing trends that could lead the economy to a subsequent crisis.¹¹⁶

4.2 NEOCLASSICAL BANK LENDING CHANNELS: A CRITIQUE

We begin our critical analysis of bank lending channels of monetary policy transmission by considering a number of neoclassical formulations of such channels, all of which, as we will see, are rooted in the loanable funds, or intermediation, theoretical perspective.

(1) *Liquidity buffer view (loanable funds theory)*

The liquidity buffer view originated in the writing of Kashyap and Stein (1995), who argued that the simplistic ‘money view’¹¹⁷ dominant at the time was an inadequate representation of monetary policy transmission, proposing instead the perspective that bank lending is of fundamental importance to the functioning of the economy and the transmission of central bank policy initiatives (pp. 154-155). The Kashyap and Stein (KS) model describes a central bank that targets the supply of base money via open market operations and is used in the

¹¹⁶ A thorough elaboration on this subject is presented in Chapter 5.

¹¹⁷ While there are a number of formulations of the ‘money view’ of varying sophistication, the simplest considers monetary policy transmission via the central bank’s increase in the money supply to the economy, which is presumed to directly increase spending and investment (IS-LM model), a theoretical representation that excludes entirely the banking sector and is the basis of a number of neoclassical transmission channels discussed in Chapter 3. An alternative interpretation of the ‘money view’ is described by Butt et al. (2014, p. 5), and involves the effects of OMOs on reserves and subsequent increases in bank lending as banks try to bring the quantity of reserves in line with reserve requirements.

original publication to study the effects of contractionary policy, which by decreasing the quantity of base money decreases the deposit funding base, reducing loan supply. Central to the description of this mechanism is the view that deposit funding is the cheapest and preferred alternative available to banks, and that a reduction in the availability of deposits as funding would cause a liquidity shortage that would force banks either to reduce the supply of loans or to increase the interest rate they charge on new loans, reducing the demand of firms for borrowed funds and slowing economic activity (p. 161).

The KS model has been capitalized on extensively, being used to study the effects of stimulative monetary policy involving the purchase of government debt and the increase in the quantity of reserves, which is presumed to lead to an increase in bank deposits and an outward shift in banks' loan supply schedules, leading to an increase in bank lending (Butt et al., 2014, p. 1). The KS model thus maintains the neoclassical perspective that monetary policy is able to determine directly the level of reserves and hence money (bank deposits),¹¹⁸ that is, loanable funds, which permit banks to provide additional loans (Bernanke & Gertler, 1995, p. 41, Butt et al., 2014, p. 5), a view that was notoriously expounded in an earlier seminal work by Bernanke and Blinder (1988, pp. 437-438).

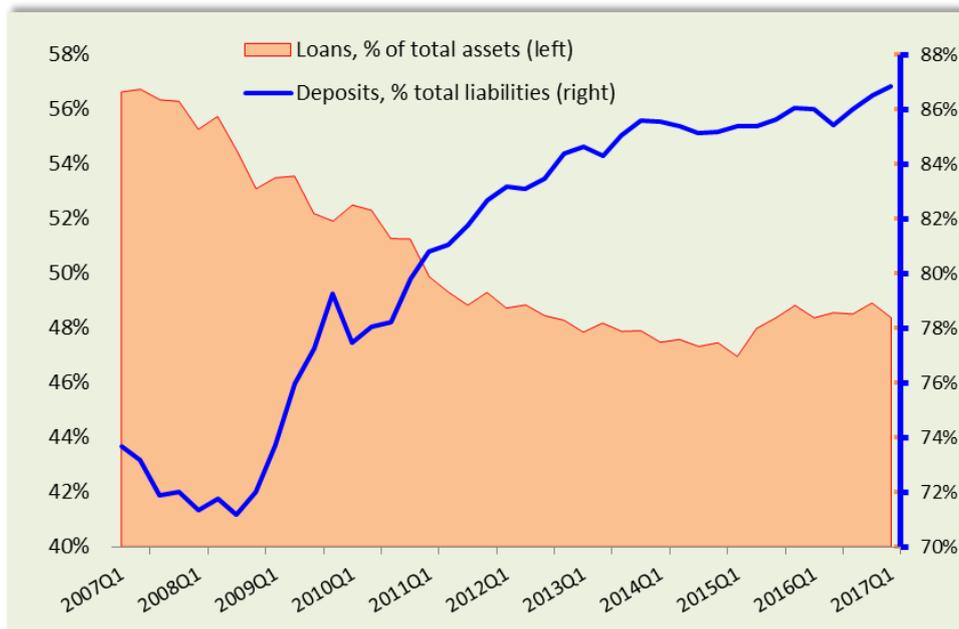
The weaknesses of the KS model, based wholly on the loanable funds approach to monetary policy analysis, become evident when considered in the context of the demand-driven credit expansion framework. Having established, in the context of the latter, that the Fed does not target the quantity of reserves but rather provides them on demand with no operational upper limit, the assumption that a central bank targets reserve quantities via open market or quasi-debt management operations is clearly problematic. The presumed link between reserves and deposits has also been shown to be a weak assumption, as central bank attempts to increase deposits via the purchase of Treasuries are futile as long as the private sector continues to deleverage.

The most evident weaknesses of the KS model are neglect of the fact that the banking sector creates deposits independently of central bank policy, and the erroneous presumption that banks depend on the central bank's provision of liquidity, or loanable funds, in order to grant a loan. In Exhibit 19, the lack of a positive correlation between the ratio of deposits to total aggregate banking sector liabilities and the ratio of total non-financial private sector

¹¹⁸ This relationship is based on the view that the quantity of money (bank deposits, ignoring cash) in the system is equal to bank reserves times the money multiplier, that is, the fractional reserve banking view (loanable funds view) (Bernanke & Blinder, 1988, p. 436). An alternative mechanism by which monetary policy is believed to impact the quantity of deposits is via portfolio rebalancing, whereby a reduction in the interest rate induces households to shift out of deposits and into higher-yielding assets, thus reducing the total quantity of deposits the banking sector can use to fund loans. Criticism of this mechanism is offered by Disyatat (2010, p. 7).

loans to total assets, is evident.¹¹⁹ While in the period between 2008 and the first quarter of 2017 the total quantity of deposits as a percentage of total liabilities has been on a steady rise, increasing from 71 to 87 percent, the ratio of loans to total assets has fallen from 56 percent to 48 percent over the same time period. Clearly, as post-Keynesian theory suggests, an increasing availability of deposits on the liabilities side of banks' balance sheets does not lead to an increase in loans, the quantity of which is demand, and not supply, determined.

Exhibit 19 Loans-to-assets and deposits-to-liabilities ratios, 2007-2017.



Source: Author's elaboration of Federal Deposit Insurance Corporation (2017) data (commercial banks' financial balance sheet data).

Variations of the KS model continue to be employed in valid empirical work on bank lending channels, such as the study by Butt et al. (2014), but with significant alterations that bring the theoretical framework in line with the credit expansion view of the banking sector. In fact, the authors, who ultimately find no significant empirical evidence for the existence of a bank lending channel working via an increase in deposits owing to central bank asset purchases, admit the challenge in "[isolating] changes in lending caused by changes in deposits from changes in deposits caused by new lending" (pp. 1-2). This modern recasting of the KS model is discussed in the context of the 'liquidity effect of reserves' (flow of credit) transmission channel shortly.

¹¹⁹ The use of different denominators for the comparison of the two trends is inconsequential as the ratio of liabilities (excluding shareholder equity) to assets has been stable at around 89% for the period 2007-2017.

(2) *The external finance premium view (loanable funds theory)*

An alternative and closely related formulation of the bank lending channel, which like the KS model has its roots in the earlier work of Bernanke and Blinder (1988) and Bernanke and Gertler (1995), is the *external finance premium* view put forth by Bernanke in a seminal speech at the “Credit Channel of Monetary Policy in the Twenty-first Century” conference in Atlanta (Bernanke, 2007). The novelty of this reformulation of the traditional bank lending channel is Bernanke’s use of the external finance premium, a concept traditionally linked to the financial accelerator model used to study effects of shocks on firms’ balance sheets and cash flows, in application to banks rather than banks’ borrowers. Bernanke draws on his earlier research with Blinder (1988), where the authors argued that “by affecting banks’ loanable funds, monetary policy could influence the supply of intermediated credit”, adding that the external finance premium banks face in raising non-deposit funding could potentially lead to a curtailment of loan supply (Bernanke, 2007).

The theoretical foundations of Bernanke’s recasting of the bank lending channel do not differ significantly from those employed by the KS model described above. Elaborated in the context of the loanable funds framework, the perspective fails to distinguish between banks, which are able to endogenously create deposits, and non-bank lenders, who must indeed source funding in order to create a liability: “Like banks, nonbank lenders have to raise funds in order to lend... Thus, the ideas underlying the bank lending channel might reasonably extend to all private providers of credit” (Bernanke, 2007, Internet).

While Bernanke (*ibid.*) admits that changes in the financial architecture (such as the evolution of the interbank markets) have occurred,

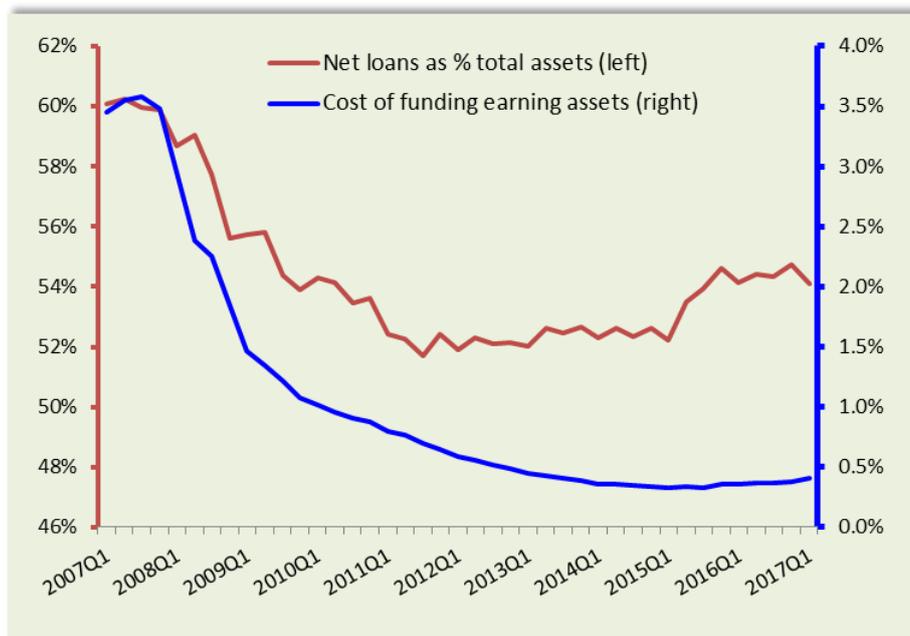
“[t]his is not to say ... that financial intermediation no longer matters for monetary policy and the transmission of economic shocks. For example, although banks and other intermediaries no longer depend exclusively on insured deposits for funding, nondeposit sources of funding are likely to be relatively more expensive than deposits ... Moreover, the cost and availability of nondeposit funds for any given bank will depend on the perceived creditworthiness of the institution.”

The constructs of this framework illustrate a failure to distinguish between banks’ profitability considerations and the aggregate banking sector’s ability to increase lending, as well as a failure to differentiate between the constraints facing an *individual* bank (whose

creditworthiness may indeed limit its ability to source funding) and the banking sector as a whole, which does not under normal market conditions face such constraints, as discussed previously.

Exhibit 20 shows two relevant trends for the 2007-2017 period, namely, the net loans and leases as a percentage of total aggregate banking sector assets and the average cost of funding earning assets. While the cost of funding earning assets has decreased dramatically from 3.45 percent in the first quarter of 2007 to a low of 0.33 percent in 2015 (rising slightly to 0.41 percent in the first quarter of 2017), the quantity of net loans and leases as a percentage of total assets has fallen consistently, decreasing from 60 to 54 percent over the entire period. This suggests that a drastic fall in the average cost of funding facing banks in the United States has not been the key to raising lending to the private sector to pre-2008 levels, contrary to the theoretical predictions of the *external finance premium* bank lending channel of monetary policy transmission.

Exhibit 20 Loans-to-assets ratio and the cost of funding, 2007-2017.



Source: Author's elaboration of Federal Deposit Insurance Corporation (2017) data (commercial banks' financial balance sheet data).

(3) Leverage ratio view (loanable funds theory)

In a similar vein to the work of Kashyap and Stein, the proposal of a *leverage ratio view* of monetary policy transmission by Peek and Rosengren (PR) aimed to extend the ‘money view’ by representing the role of the banking sector in loan extension and, in particular, the importance of capital constraints faced by banks in determining lending to the production economy (1995b, p. 48). The PR model made an important contribution to the profession’s theoretical understanding of the banking sector’s role in the transmission of monetary policy by theorizing that “a bank facing a binding capital-to-asset ratio will be unable to expand its assets in response to an easing of monetary policy, even if loan demand increases with the ease in policy, since it is a shortage of capital, not reserves, that is preventing the bank from increasing its lending” (p. 48).

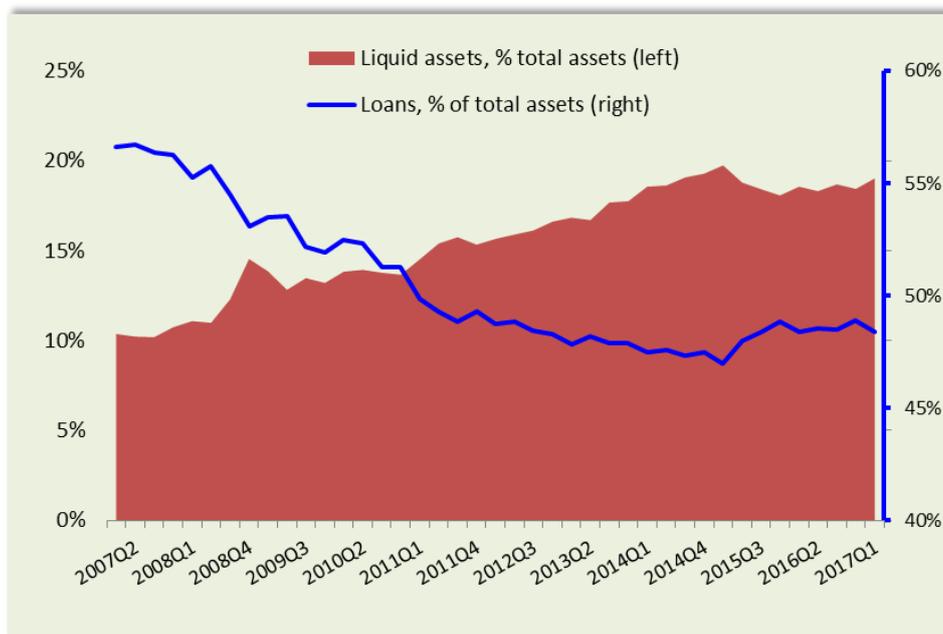
The PR model and its empirical results thus served to highlight the limits of stimulative monetary policy under the existence of capital constraints (see section 5.4). However, the mechanism via which monetary policy might encourage the lending activity of banks with no capital constraints relies on assumptions no different from those presented in the *external finance premium* and the *liquidity buffer* views, within the framework of the loanable funds theory. As such, in the PR model, banks that face no capital constraint are able to use the new deposits created by ‘expansionary’ monetary policy to expand their loan book (Butt et al., 2014, pp. 5-6), potentially leading to higher output. At the heart of this mechanism is the representation of banks as financial intermediaries and a direct link between central bank-determined reserve quantities and the quantity of bank deposits (Peek & Rosengren, 1995b, pp. 50 and 57), based on the fractional reserve banking view. According to this view, an increase in the quantity of reserves allows banks to ‘sell’ a greater number of deposits, which subsequently fund lending and which have no appropriate substitute (Hubbard, 1995, pp. 70-71).¹²⁰ As such, the criticisms presented in the discussions of the liquidity buffer and the external finance premium formulations of monetary policy transmission apply with equal force to the ‘expansionary’ case of the leverage ratio model developed by Peek and Rosengren. In the context of the post-Keynesian framework of endogenous broad money creation, there is limited scope for the justification of views that

¹²⁰ Expounding on the model proposed by Peek and Rosengren, Hubbard (1995, p. 72) writes: “The bottom line is that when loans and CDs [certificates of deposit] are imperfect substitutes [for bank deposits], both [the spread between the rate on loans and the rate on deposits] and loan supply will be affected by shocks to reserves”.

depend on a direct link between changes in reserve and deposit quantities or bank lending decisions dependent on the availability of ‘lendable’ deposits.

In addition to the empirical evidence presented in Exhibits 19 and 20 in support of the post-Keynesian critique of neoclassical bank lending channels based on the loanable funds view, we illustrate the negative correlations of two further sets of variables relevant for the discussion at hand in Exhibits 21 and 22. Exhibit 21 shows the aggregate banking sector’s liquidity position using the ratio of liquid assets (including local and federal US government securities, vault cash and central bank reserves) as a percentage of total assets, and the familiar at this stage trend of total non-financial private sector loans as a percentage of total assets for the 2007-2017 period. As the graph shows, while the liquidity position of the banking sector has improved dramatically (for a graphical illustration of the corresponding increase in central bank reserves see Exhibit 2), contrary to the predictions of the leverage ratio view theory of monetary policy transmission, the quantity of loans has decreased.

Exhibit 21 Bank liquidity positions versus the loans-to-assets ratio, 2007-2017.



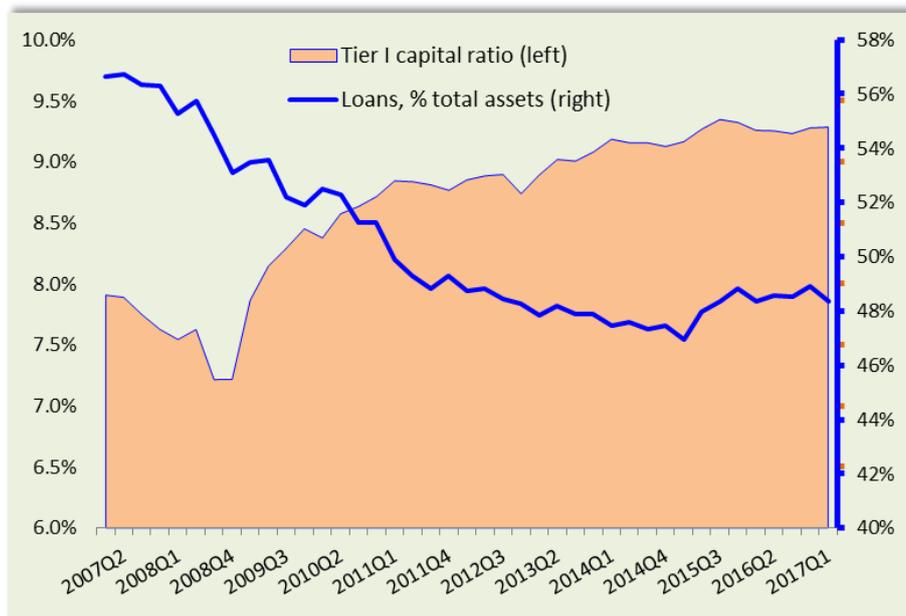
Source: Author’s elaboration of Federal Deposit Insurance Corporation (2017) data (commercial banks’ financial data – balance sheet).

In fact, it is most logical to view loans and liquid assets as alternatives to one another (since both appear on the assets side of banks’ balance sheets), rather than complements whereby the increase in liquidity ‘causes’ an expansion of the aggregate loan portfolio. As the graph illustrates, the two trends are an almost-perfect mirror image of each in the decade captured by Exhibit 21. A combination of voluntary household deleveraging (see Exhibits 13

and 15) for most of the decade and the banking sector’s shift in liquidity preference (reflected via banks’ voluntary participation in the central bank’s liquidity programmes) are responsible for these trends.

Exhibit 22, our final empirical contribution to the rebuke of the loanable funds approach to the analysis of monetary policy transmission, contrasts the evolution of two ratios over the decade beginning in 2007: the aggregate-level Tier I leverage capital ratio (a risk-based measure of equity capital calculated for compliance with regulatory capital requirements) and the total non-financial private sector loans as a percentage of the total assets ratio, which has featured in a number of exhibits thus far. What is crucial to highlight with regards to the relationship between these two variables over time is that, while the capital ratio has been increasing, illustrating an improving level of capitalization of the US banking system since the 2008 crisis (and hence an easing of capital constraints in the aggregate), the loans-to-assets ratio has been falling. This relationship contradicts the prediction of the leverage ratio view theory, which presumes that an easing of capital constraints would permit and encourage banks to issue a greater quantity of loans to the private sector.

Exhibit 22 Tier I capital versus loans-to-assets ratios, 2007-2017.



Source: Author’s elaboration of Federal Deposit Insurance Corporation (2017) data (commercial banks’ financial balance sheet data; PCA definition of Tier I leverage capital).

4.3 ALTERNATIVE FORMULATIONS OF BANK LENDING CHANNELS

In the absence of plausible formulations of the bank lending channel within the neoclassical tradition, we now turn to examine the fruits of more recent monetary policy research on the potential of central bank stimulus to positively affect economic activity via the banking sector. Significant academic effort has been made to recast the neoclassical formulations of bank lending channels described above in the framework of the endogenous money (credit) view, which, contrary to the loanable funds perspective, offers an accurate representation of the functioning of the monetary system, as discussed in section 4.1.

Post-2008 crisis research on the bank lending channel has also produced important evidence that low interest rate policy and large-scale quasi-debt management and credit policies have had the unintended consequence of promoting excessive risk-taking amongst banks, as illustrated by negative dynamics on both the assets as well as the liabilities side of the banking sector's balance sheet. More precisely, this area of research looks at the influence of stimulative monetary policy on the perception and risk tolerance of banks, particularly via the ensuing change in asset and collateral values, lower price volatility and lower estimates of default probabilities, which taken together may be contributing to greater risk-taking by lenders. Prolonged periods of lax monetary conditions are thus believed to lead to a deterioration of banks' loan portfolios and riskier funding strategies (Borio & Zhu, 2008; Borio, 2011a; Mirkov, 2012). These effects have been grouped into a so-called *risk-taking channel* of monetary policy transmission. While we do not present this as an independent channel in the ensuing discussion, consideration of the underlying dynamics is offered alongside the analysis of the theoretical positive balance sheet channels, as such dynamics represent substantial evidence of the failure of monetary policy to achieve the objective of promoting a long-term, sustainable recovery in endogenously-determined rates of economic growth.

4.3.1 PROFITABILITY AND THE DEMAND-DRIVEN PROCESS OF CREDIT EXPANSION

The purpose of this section is to sketch an endogenous money and demand-driven credit expansion framework for the analysis of a number of alternative formulations of bank lending channels of transmission, which will allow us to search for theoretical avenues via which monetary policy may positively impact the rate of endogenously-determined economic growth in a post-crisis period, where interest rates have hit the zero lower bound, activity in

the production economy is lacklustre and inflation remains below the central bank's policy target.

A useful starting point for this task is the work of Disyatat (2010), in which the author sketches a comprehensive framework for studying bank lending channels from an endogenous money perspective, which recognizes the lack of endogenous constraints on the banking sector's ability to grant marginal loans and emphasizes risk management and profitability considerations in banks' lending activities, as well as the demand-driven nature of the loan extension process. Disyatat (2010, p. 9) underscores that regulatory capital requirements act as the only hard, exogenous constraint on asset expansion rather than the availability of bank deposits as in traditional formulations, since the granting of a new loan and the creation of a corresponding bank deposit occur simultaneously. Hence, "there is no quantitative constraint on bank lending. Any outward shift in the loan demand curve can always be accommodated" (p. 17).

In the Disyatat (2010) bank lending framework, potential influence of monetary policy on economic activity occurs via the central bank's impact on the interest rate the banks charge on loans, which in turn determines firms' demand for borrowed funds. In particular, "[p]olicy changes give rise to endogenous variations in financing conditions through the banking sector that are driven by changes in the extent to which bank capital can serve to cushion depositors from possible loan losses" (p. 18). These changes in endogenous bank capital determine the cost at which banks are able to secure necessary funding, which in turn impacts their profitability calculations, changing the interest rate at which they are willing to extend a marginal loan.

More specifically, this mechanism can be decomposed into two separate channels of influence of monetary policy on bank funding conditions, the first concerning actual changes in banks' balance sheets that improve the capital-asset ratio while the second considers the possible impact of policy on risk perceptions of financial market participants. Crucial to the existence of both channels is the resulting change in the external finance premium, determined by the expected probability of a bank default, a measure based on a bank's level of net worth and the perceived level of riskiness of its asset portfolio (p. 18). Disyatat's (2010) framework thus draws on the Bernanke (2007) concept of the external finance premium, while presenting an important diversion in the rebuttal of the loanable funds and money multiplier views used by the latter, instead adapting the concept to a framework supporting endogenous money creation and the demand-driven nature of the process of credit expansion.

While in the empirical application Disyatat's (2010) work considers the effect of 'contractionary' interest rate policy, of limited suitability for the analysis of monetary policy during a period of recession when interest rates have reached the zero lower bound, we nonetheless capitalize on the theoretical mechanisms of transmission and funding dynamics delineated by the framework to undertake a detailed analysis of two groups of loosely-related literature, which represent two potential alternative channels of monetary policy transmission that have emerged in the course of the post-crisis years.

4.3.2 MONETARY POLICY'S EFFECT ON BANK BALANCE SHEETS

(4) *The asset price support and the risk-taking channels*

As we have seen thus far, the importance of bank capital in determining banks' cost of funding, profitability calculations and the interest rate applied to marginal lending has been highlighted and incorporated into neoclassical models of monetary policy transmission at least since Peek and Rosengren's formalization of a theoretical mechanism in 1995. Since the start of the credit crunch of 2007 and the subsequent financial crisis, monetary thinkers have attempted to recast this transmission channel, in an effort to draw a link between post-crisis central bank policy and banks' willingness to lend to firms for production purposes.

Bank capital, or the book value of equity, is an important consideration for a bank facing binding exogenous regulatory constraints as well as endogenous risk management limitations. Monetary policy transmission models incorporating bank capital rely on the assumption (supported by empirical studies) that raising new bank equity is a financially costly funding strategy and banks are thus equity constrained, albeit to varying degrees.¹²¹ A bank's equity is, however, considered an endogenous factor to the degree that, even in the absence of new equity issuance, bank capital fluctuates owing to changes in the bank's assets and liabilities.

The formulation of a potential bank capital channel of monetary policy transmission relies on policy-induced changes to either the assets or the liabilities side of the aggregate banking sector's balance sheet, which in turn alters the overall level of capitalization of the banking sector. We first consider the impact of policy on bank assets, that is, the *asset price support* channel, studying liabilities side changes hereafter. Disyatat's (2010) framework described above proposes two possible avenues via which monetary policy may impact the value of bank assets. First, changes in interest rates affect cash flows, the net interest margin

¹²¹ A review of relevant literature is provided by Van den Heuvel (2007, pp. 7-8).

and the valuation of assets through the discount factor; second, changes in the value of assets held by banks may occur as a result of an improvement in the balance sheets of firms and households owing to stimulative interest rate policy (p. 19). To this we can add a third possible avenue, namely the direct impact of quasi-debt management and credit policy on the value of public and private sector assets held by the banking sector.

In the context of the bank lending channel, it is the first and third avenues that most warrant consideration, as the impact of monetary policy on the balance sheets of firms and households has already been presented in evaluation of the balance sheet channel in Chapter 3. When interest rate policy reached the zero lower bound, the Fed turned to the purchase of private and public assets, with the stated purpose of putting downward pressure on long-term interest rates and supporting the prices of assets in select credit markets. One hypothetically possible formulation of the bank lending channel thus suggests a link between central bank asset purchases, which theoretically put downward pressure on long-term interest rates, increasing the value of assets generally as a result of a lower discount factor, and raise directly the value of those assets targeted by the asset purchase programmes. Higher asset valuations increase bank capital, which allows banks to take on additional leverage within the externally-enforced capital adequacy requirements and internally-determined risk management limits and considerations. The general increase in banks' capitalizations, and hence decreased risk of bankruptcy, lowers the external finance premium facing the average bank, putting downward pressure on the interest rates banks charge on loans. Somewhat similar formulations of the bank lending channel have been presented in recent mainstream literature such as Gertler and Kiyotaki (2010, pp. 11-12) and Gertler and Karadi (2011, pp. 20-21). The lower loan rates encourage firms and corporations to borrow, increasing demand for loans and eventually the quantity of loans supplied by the banking sector.

Although this formulation of a bank lending channel of monetary policy transmission fits neatly into a theoretical framework based on endogenous money and the credit-creates-deposits view, where bank lending is motivated by risk and profitability considerations, and where the supply of bank loans is determined by firms' and households' demand for credit rather than banks' ability to lend at the margin, it, too, is not without its weaknesses. For example, one inevitable side-effect of central bank asset purchases is the expansion in the quantity of reserves, which the banking sector can do nothing to eliminate (see Exhibit 2). Empirical research by Martin et al. (2011) suggests that, contrary to the theoretical suggestion (albeit in the neoclassical framework of monetary policy analysis) that large quantities of reserves ease lending conditions, balance sheet cost frictions facing banks result in a

contractionary effect of large reserves on bank lending activity, as banks are forced to pass on the balance sheet costs to borrowers, which lowers demand for loans (p. 8).

Furthermore, as has been extensively argued in section 3.2, asset price changes resulting from monetary policy stimulus are likely to be temporary in nature, reverting back to fundamentals when the central bank withdraws price support and reverses its asset purchases (Carney, 2016, p. 13). A similar argument has been made, and empirical evidence provided, that credit policy-induced changes to long-term interest rates are temporary, reversing after approximately a one-year time horizon and suffering from a diminishing returns effect (see section 3.1.1; Stein, 2012; Hanson & Stein, 2015, p. 447). Such findings suggest that any positive impact that monetary policy may have on bank capitalization via changes in asset prices is transitory, with bank capital likely to decrease within a short time horizon, once monetary policy stimulus is removed. On the contrary, changes in liabilities resulting from an expanded quantity of loans would by definition be more persistent, given the longer duration of bank loans to firms and corporations.

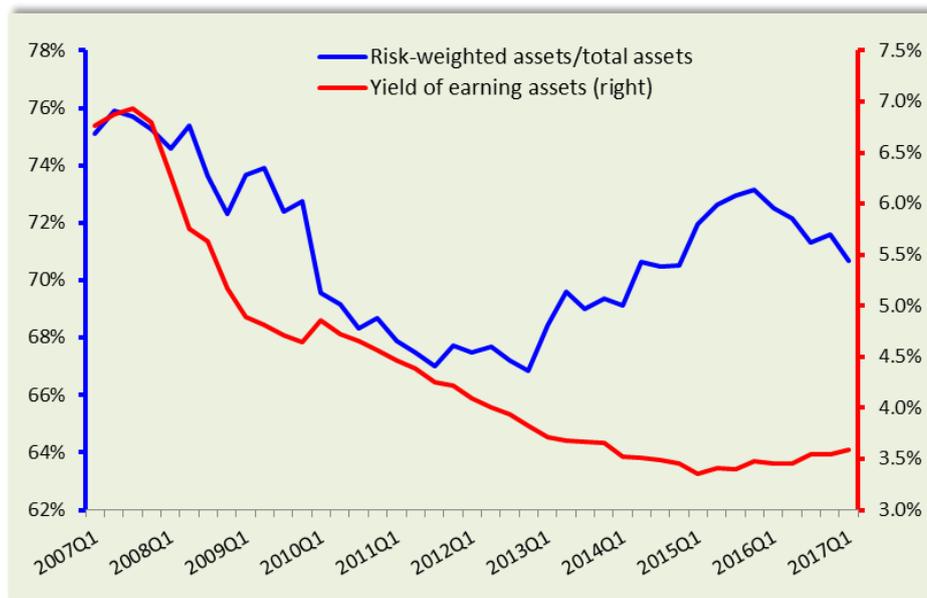
These potentially problematic dynamics are captured by the risk-taking channel of monetary policy transmission, which, by contrast to the hypothetical bank lending channel discussed in this section, has received significant attention in recent empirical and policy-oriented research. While there is limited empirical investigation into the direct impact of higher asset prices on bank lending behaviour, empirical evidence has drawn an undisputable link between low interest rate policy, increasing bank leverage and a deterioration of the assets side of banks' balance sheets in the years prior to the 2008 financial crisis. Maddaloni and Peydro (2010) and Angeloni et al. (2015) show that low short-term interest rates encouraged banks to shift their funding structure towards shorter-term liabilities, at the expense of more costly long-term debt (a trend that is repeating in the recent years), and to increase leverage, augmenting endogenous bank riskiness.

Further, Jimenez et al. (2008) and Bassett et al. (2014) provide empirical evidence that during prolonged periods of low interest rate policy, competitive pressure causes banks to loosen their lending standards, causing a deterioration of the loan portfolio on the assets side of the banks' balance sheets. Overall, this endogenously-created risk in the long term is likely to have a contractionary effect on the economy via a number of channels, including increased probability of bank insolvency, rising investment project risk and lower productivity owing to "resource costs of projects' liquidation" (Angeloni et al., 2015, p. 286). Unfortunately, in the upswing phase of the leverage cycle, these negative dynamics may be difficult to extract from the data. The subjective nature of the evaluation of lending standards

makes it particularly challenging to predict the realized rate of default that will accompany a subsequent financial squeeze. Likewise, the endogenous nature of bank equity, which is boosted by a sustained rise in asset prices that is characteristic of the upswing phase of the leverage cycle and which may fall precipitously during a downturn, necessitates treating this variable with caution.¹²²

Nonetheless, signs of increasing risk-taking have begun appearing on the assets side of banks' balance sheets. The most general measure of such risk is shown in Exhibit 23. This exhibit illustrates the continuous squeeze of yields that banks have faced over the decade since the crisis, with only a slight reversal of this trend evident since 2016, but, more important, it shows the trend of risk-weighted assets as a percentage of total assets, a critical measure of the total risk that the aggregate banking system holds on the assets side of its balance sheet.

Exhibit 23 Increasing risk of assets in the context of decreasing yields, 2007-2017.



Source: Author's elaboration of Federal Deposit Insurance Corporation (2017) data (commercial banks' financial data – balance sheet).

While after the crisis banks moved a significant portion of assets into safer categories of loans, reducing loan portfolio risk drastically over the course of approximately five years,

¹²² Even conservative measures of the fair value of balance sheet assets at times require subjective input and, in the case of many assets, are inevitably reflective of current market prices. See Federal Deposit Insurance Corporation (2000b) for legal definitions and valuation rules and requirements.

this trend has seen a rapid reversal since the last quarter of 2012, with risk reaching critical 2009 levels before decreasing marginally over the course of 2016.

A more detailed synopsis of the situation can be glanced from Exhibit 24, which illustrates the various loan categories held on commercial banks' balance sheets and the corresponding quarterly net charge-off rate, as well as the percentage each loan category represents of the total loan portfolio of the aggregate banking sector balance sheet. Most crucial to note is that between 2010 and 2016 the charge-off rate on commercial and industrial loans as well as on retail loans has increased significantly, illustrating a deterioration of loan quality in these categories of lending, which make up a significant portion of the overall loan portfolio (nearly 40 percent in 2016). Although the quarterly net charge-off rate on all categories of real estate lending has fallen significantly, it must be highlighted that the charge-off rate on loans collateralized by real estate is highly dependent on the ability of borrowers to refinance, which is generally possible at times of rising real estate prices, characteristic of the period since 2010 (see Exhibit 17). This trend can quickly reverse, as occurred in 2007, when tensions in the mortgage market arise and borrowers are unable to refinance.

Exhibit 24 Evolution in the banking sector's aggregate loan portfolio, 2007-2016.

Loan category	Quarterly net charge-offs			% of total loan balance		
	2007:Q4	2010:Q4	2016:Q4	2007:Q4	2010:Q4	2016:Q4
Real estate construction & development	8.3%	12.5%	0.2%	8.0%	4.4%	3.4%
Home equity loans	7.7%	8.7%	2.1%	7.7%	8.6%	4.7%
Other 1-4 family residential real estate	13.4%	18.1%	1.5%	28.3%	25.8%	21.4%
Nonfarm nonresidential real estate	3.3%	8.9%	0.9%	12.2%	14.5%	14.2%
Commercial & industrial	19.0%	10.6%	20.1%	18.2%	16.0%	20.8%
Credit cards	25.2%	30.3%	55.9%	5.3%	9.5%	8.6%
Other loans to individuals	18.9%	7.2%	15.4%	8.0%	8.3%	8.5%
All other loans & leases	4.2%	3.8%	3.8%	12.1%	12.9%	18.4%

Source: Author's elaboration of Federal Deposit Insurance Corporation (2017) data (quarterly loan portfolio performance indicators, all FDIC-insured institutions).

On the whole, even if future empirical research were to find significant evidence that increased asset prices have acted to improve bank capitalization rates, acting via the external finance premium to increase demand for cheaper bank loans, quasi-debt management and credit policy employed for the purpose of stimulating produced output via this channel would be difficult to justify given the temporary, non-fundamental nature of such price changes, and

given the significant evidence of negative dynamics that occur via the assets side of banks' balance sheets as represented by the risk-taking channel of monetary policy transmission.

(5) *The liquidity effect of reserves and the risk-taking channels*

Having considered policy-induced changes on the assets side of the aggregate banking sector's balance sheet, we turn to consider the liquidity effect of reserves, a theoretically plausible channel of monetary policy transmission acting via the liabilities side of banks' balance sheets. This channel can be considered a recasting of the Kashyap and Stein's *liquidity buffer view* (Kashyap & Stein, 1995) into an endogenous credit expansion framework of the banking sector, and has been used in the aforementioned empirical analysis by Butt et al. (2014). The mechanism is presumed to be the following: as the central bank engages in the purchases of government bonds from the non-bank private sector, most frequently from non-bank financial institutions such as pension funds, insurance companies and asset managers, the quantity of deposits in the banking sector increases. In such transactions, banks act as intermediaries between the central bank and the selling counterparties, receiving the deposit on the sellers' behalf. The additional deposits, which have been created as a result of transactions between the central bank and the non-bank sector rather than endogenously by the banking sector itself, supposedly improve liquidity conditions, increasing the availability of cheap funding and allowing banks to expand lending to the private sector (Butt et al., 2014, pp. 5-6; Poloz, 2015, pp. 4-5). Adoption of this view within the endogenous credit expansion framework necessitates the separation of the deposit-creation process into the endogenous element (which occurs as banks lend) and the exogenous element (which occurs as a result of the non-bank private sector's portfolio rebalancing towards greater liquidity) – a challenging task for empirical analysis (Butt et al., 2014, pp. 1-2).

Considerations challenging the theoretical validity of the *liquidity effect of reserves* channel of transmission are several. In the endogenous credit expansion framework, the banking sector is always in the position to meet demand from creditworthy entrepreneurs with valid investment projects requiring funding, albeit at interest rates reflecting the banks' cost of funds and the credit risk of the marginal loan. In the absence of demand from corporations and firms, or in the context of a general deleveraging where new debt is simply used to repay old debt, the aggregate quantity of loans will not expand. Within the instrumental analytical framework proposed by Disyatat (2010), monetary policy may impact the interest rate at which banks offer loans by affecting the banks' own cost of funds, via an

improvement in the level of capitalization. The provision of additional deposits to the banking sector, however, has no positive effect on the capital held by the banking sector. On the contrary, the simultaneous increase in reserves and deposits resulting from the credit operations between the central bank and the non-bank financial institutions will lower the capital ratios of the banks acting as intermediaries in the exchange.

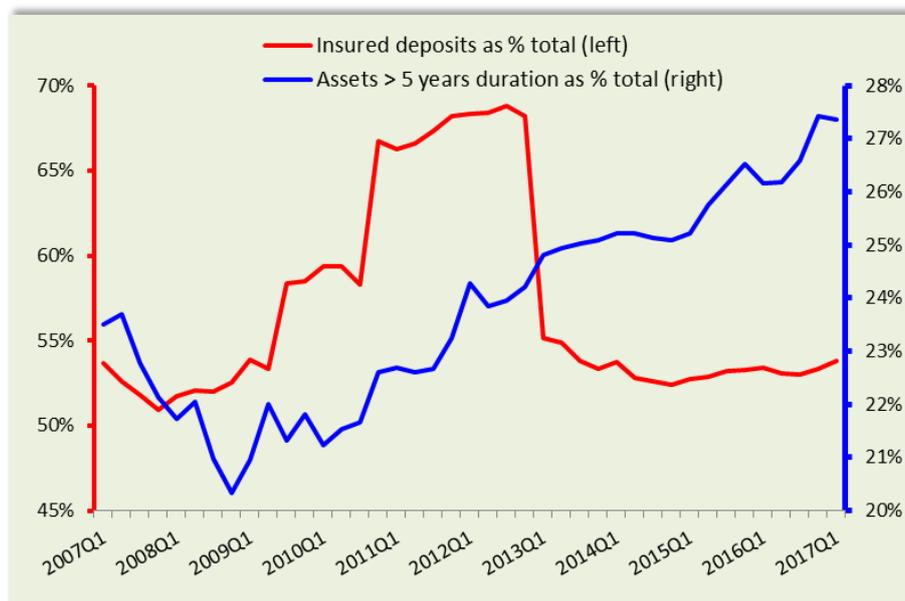
Empirical evidence also appears to negate the hypothesis that central bank policy may encourage bank lending via the *liquidity effect of reserves* channel. Butt et al. (2014), who search for statistical evidence of an increase in bank loans caused by an exogenous increase in deposits, fail to find such evidence, suggesting that deposit ‘flightiness’ precludes bank reliance on this form of funding. Black (2007) also finds that the percentage of banks that rely on core deposits to fund lending activities is insignificant, with the majority of banks relying on non-core deposit funding or maintaining a sufficient ‘buffer stock’ of deposits to insulate from any monetary policy-induced shocks to deposit funding. Empirical work by Carpenter and Demiralp (2012) offers further support for this view.¹²³

Not only may monetary policy be ineffective in stimulating bank lending via changes to the liabilities side of the aggregate banking sector’s balance sheet, but furthermore there is evidence of a problematic dynamics in liabilities management developing as a result of prolonged low policy rates of interest and central bank asset purchases that exert (temporary) downward pressure on long-term interest rates. Angeloni et al. (2015) offer evidence that reliance on short-term market funding instruments, such as certificates of deposit (CDs) and repos collateralized by securitized products such as asset-backed securities (ABSs), has increased dramatically since the financial crisis of 2008 (p. 291), an attractive funding strategy at times of low rates of interest (p. 299) and in the context of the resulting squeeze on profitability. A similar argument has been made in a paper by Greenwood et al. (2016). Such a funding strategy is risky for banks, given that short-term wholesale funding is quick to evaporate when market tensions increase. In fact, empirical evidence shows that an increased reliance on non-core banking sector liabilities (that is, wholesale funding sources) indicates mounting vulnerability to a financial crisis (Hahm et al., 2012), in which the market for repos collateralized by securitized products including ABSs, collateralized debt obligations (CDOs) and credit default swaps (CDSs) shuts down and the banking sector as a whole becomes insolvent (Gorton & Metrick, 2012), requiring central bank intervention as lender of last resort on a massive scale.

¹²³ For a formal definition of core deposits see Federal Deposit Insurance Corporation (2015, sections 6.1-6.8).

Although, as we have noted (see Exhibit 19), in the aggregate the overall quantity of deposits held by the banking sector has increased since the financial crisis, Exhibit 25 illustrates that the percentage of uninsured deposits to total liabilities has increased significantly since 2012, a trend that is symptomatic of a developing weakness in the bank funding structure, given the inherent instability of uninsured relative to insured deposits as sources of funds on the liabilities side of banks' balance sheets. Simultaneously, the proportion of assets with a duration of over five years has been on a steady increase since 2009, suggesting that banks have been issuing loans of increasing maturity to compensate for the drastic fall in yields and consequent profitability squeeze that has characterized this period (see Exhibit 23). This empirical observation of diverging trends in the assets and liabilities of the aggregate banking sector balance sheet lends further support to concerns regarding the transmission of monetary policy stimulus via the risk-taking channel, which we have considered in the context of the policies implemented by the Fed in the decade since the financial crisis of 2008.

Exhibit 25 Increasing duration of assets and the rise in uninsured deposit funding, 2007-2017.



Source: Author's elaboration of Federal Deposit Insurance Corporation (2017) data (commercial banks' financial data – balance sheet).

4.4 AT THE FRONTIER OF MONETARY POLICY INNOVATION: SHOULD THE FED FOLLOW SUIT?

In the context of the mounting evidence that, to date, Federal Reserve monetary policy has been ineffective in stimulating economic growth via the banking sector, a view supported by our hitherto analysis, two additional monetary policy initiatives are worth examining. Both have been employed outside the United States in an attempt to stimulate lending to firms for production purposes via the banking sector, and include the lending for credit (or funding for lending) programme employed by the BoE since 2012, and negative interest rate policy, which a number of central banks have experimented with in recent years. We examine these two proposals in turn, considering exclusively their theoretical validity, as the novelty of these central bank strategies precludes conclusive empirical investigation.

(6) *Lending for credit: a proposal*

The theory behind a *lending for credit* scheme rests on the *external finance premium* concept and hence relies on a transmission mechanism similar to that described in the previous section in several different formulations. Under a lending-for-credit programme, a central bank provides funds to commercial banks with the purpose of lowering their funding costs and thus the interest rate on the credit they are willing to provide to their customers. As such, this formulation of monetary policy transmission appears coherent in the context of the endogenous credit expansion framework and supportive of the demand-determined quantity of credit construct. What distinguishes this approach to monetary policy stimulus from those discussed previously is its purposeful design intended to encourage the benefitting banks to lend to firms for production purposes, rather than for investment in the financial sector.

Conditions creating such channelled use of funds can be construed in a variety of ways, and we use the Bank of England's funding for lending scheme (FLS) as a mere example of the implementation of this policy in recent years. The BoE's FLS, launched in 2012, offers extended-period borrowing subject to interest rates that incentivize lending to small and medium-sized enterprises and to households. Acting, in theory, via the external finance premium, the FLS aims to impact banks' lending profitability, allowing them to offer consumer and corporate loans on more favourable terms and at lower interest rates. Investment in production activities and in consumption is, in turn, ultimately expected to increase output (Churm & Radia, 2012, pp. 308-309).

The theoretical advantage that this formulation of monetary policy transmission has over the more widespread applications of central bank lending schemes discussed in section

4.3 is that loans extended to banks under a lending-for-credit programme are necessarily channelled towards production activities, rather than for speculation or investment in the financial sector. In practice, however, this may not always be the case. There is evidence that firms and corporations, taking advantage of low rates of interest to borrow from banks, use the borrowed funds to buy back shares, to hoard cash or to pay off existing debt, in the absence of valid investment opportunities or as a result of a generally pessimistic evaluation of future economic prospects (Bates et al., 2009; MacMillan et al., 2014; Gross, 2016). Furthermore, incentivizing banks to lend may be a risky strategy for a number of reasons. An expansion of commercial banks' loan portfolios funded by (albeit long-term) funds from the central bank may create a negative trend in bank capital ratios. There is also the theoretical possibility that central bank interference in banks' lending decisions may mute the banking sector's risk assessment mechanism, increasing the banking sector's leverage and creating dangerous financial fragility. Finally, we will argue subsequently that central bank policy that encourages debt-driven (rather than income-driven) consumption holds significant negative implications for long-term economic growth dynamics (see sections 5.2.1-5.2.3). As such, excessive focus on lowering the risk premium applied to commercial and consumer loans to encourage borrowing may be counterproductive and ultimately destructive to the goal of promoting sustainable, long-term economic growth.

(7) *Negative interest rates*

The last bank lending transmission channel that we consider is related to the policy of negative interest rates, untried and untested in the context of the US economy, but receiving a significant amount of attention in academic and policy-making circles since the implementation of negative rates by the ECB and the central banks of Denmark, Sweden, Switzerland and Japan starting in 2014.¹²⁴ Although recent experience has shown that negative interest rates are technically possible, at least at levels slightly below zero, the theoretical validity and effectiveness of such policy remains highly debatable. Advocates of negative interest rates cite the ever-decreasing scope for balance sheet policies to influence the economy and the need to make available to the Federal Reserve additional room for manoeuvre to allow it to respond adequately to the next economic contraction (Goodfriend, 2016, p. 21). Although we do not endeavour to examine the pros and cons of sub-zero interest rate policy from all theoretical angles, the subsequent analysis indicates that there is no

¹²⁴ For the specifics of each central bank's negative interest rate policy implementation see Jackson (2015).

convincing evidence that further cuts to the policy rate of interest would allow the Federal Reserve to exert a positive influence on production activities.

In the context of the analysis of bank lending channels of monetary policy transmission, we consider two theoretical avenues via which, according to some monetary policy analysts, negative interest rates harbour the potential to transmit monetary policy stimulus via the banking sector to production activities. According to one formulation, negative interest rates may be, at least partially, passed on to firms and corporations in the form of lower borrowing costs, which are subsequently expected to increase the demand for loans and consequently investment in production activities (Bech & Malkhozov, 2016, pp. 40-41). In order to rationalize this formulation within the theoretical framework employed in the hitherto analysis, we may present this view as the latest generation of the *external finance premium view* so familiar to us at this stage. The second theoretical rationale for negative interest rates is that this policy would make holding bank reserves unattractive compared to other assets, including loans to consumers and the corporate sector (Waller, 2016), thus stimulating bank lending and investment in production activities.

The second formulation can be readily discarded without a comprehensive analysis, since the fact that banks cannot lend out reserves has been duly justified. Palley (2016) also highlights this theoretical glitch (p. 6), and Lavoie (2010) stresses that a policy of negative interest rates would furthermore undermine the fundamental structure of the floor system in use by the Federal Reserve (p. 16). The floor system has been of fundamental importance to the central bank in the post-crisis year, allowing it to effectively manage interest rates in an era of abundant reserves (Yellen, 2016), which are the result of the Federal Reserve's mass-scale asset purchase programmes. As such, it would be a contradiction to effectively punish banks for holding reserves (by forcing them to pay a penalty rate of interest on excess reserves) at a time when the accumulation of such reserves is an inevitable by-product of policies carried out by the central bank itself (Anderson & Liu, 2013, p. 13).

A number of other general criticisms of negative interest rate policy have surfaced in the recent whirlwind of academic discussion on the subject. Garbade and McAndrews (2012) argue that interest rates that go beyond -0.5 percent would spur a variety of innovative yet "socially unproductive" practices by financial service providers that would create new challenges for financial market participants and regulators. In fact, there is already anecdotal evidence that banks are investigating the possibility of storing significant amounts of cash, avoiding charges they may incur by keeping excess reserves on accounts with the central bank, if only as a mere sign of protest in the face of a possibility of negative interest rate

policy (Jones & Shotter, 2016). A number of other forms of innovation geared at reducing the costs of holding currency in response to negative interest rates are being considered by researchers evaluating this policy at central banks (McAndrews, 2015).

There has also been a growing volume of research on the technical arrangements central banks could adopt to make enforcement of negative interest rates possible (Agarwal & Kimball, 2015; Goodfriend, 2016). What is more relevant to the discussion at hand, however, is how this policy, which indeed may be technically possible in the United States under some innovative institutional arrangement, will be transmitted to the so-called ‘real’ economy if there is increasing scope for the central bank employing negative policy rates of interest to spur economic growth during a post-crisis recession. With this objective at hand, it is fundamental to consider the likely effects of negative interest rates on bank profitability, established in our prior analysis to be the major determinant of bank lending. To this purpose, the concern that negative interest rates are likely to squeeze bank profitability, already being eroded by a long period of low interest rates, has been highlighted by both academics and central bank policy makers (Borio et al., 2015; Carney, 2016, p. 14).

One suggestion for dealing with this important complication has been elaborated in a recent International Monetary Fund paper and involves:

“[subsidizing] banks in their shielding of small accounts from negative rates by tying the ceiling on the amount of funds on which a bank can get an above-market zero interest rate in its reserve account to some evaluation of how well it is giving zero interest rates to households the central bank hopes will see zero interest rates and how well it is passing through negative rates to other depositors the central bank hopes will face negative interest rates” (Agarwal & Kimball, 2015, p. 16).

That “[d]etermining the narrow economic merits and demerits of such subsidies (including distributional concerns) would be a substantial task”, as the authors themselves admit, is a colossal understatement. The proposal of policies that suggest a wholesale micromanagement of the business decisions of the entire banking sector by the central bank seems only to support the observation that “the most insidious aspect of negative interest rates is what it signals: that central banks are at their wits’ end over how to invigorate growth and dispel the spectre of deflation” (Wigglesworth et al., 2016, Internet).

Setting aside outlandish proposals for dealing with commercial banks’ profitability squeezes, the latter remains an important impediment to the transmission of stimulus from negative interest rates to production activities via the first of the two aforementioned

channels. More precisely, if banks are unwilling or unable to pass negative rates on to depositors, which is likely to be the case (Carney, 2016, p. 14), they may be forced to make up the lost margins by raising lending rates, rather than lowering them. There is empirical evidence that banks in Switzerland and in Denmark were unable to lower rates on retail deposits when their central banks pushed the reference rate into negative territory (Moselund Jensen & Spange, 2015, p. 1; Bech & Malkhozov, 2016, p. 39) and further evidence that, in Switzerland, higher lending rates were used as a compensation strategy (Bech & Malkhozov, 2016, p. 39). As such, the policy of negative interest rates may actually act to dampen, rather than to raise, demand for corporate and consumer loans, depressing investment in production activities.

Not only are negative interest rates unlikely to be successful in expanding the volume of bank loans issued to corporations and households. In fact, there are a number of possible negative dynamics associated with this policy. One potential, though to date unrealized, negative consequence of policy-induced negative interest rates is engineered glitches in interbank market trading activity, an example of which may be the failure to deliver collateral in a timely manner to delay receipt of cash (Bech & Malkhozov, 2016, p. 38). Furthermore, as the pass-through of negative interest rates to interbank market instruments such as certificates of deposits is high (Moselund Jensen & Spange, 2015, p. 3) while the pass-through to customer deposits is low, as discussed previously, negative interest rates are likely to stoke further the trend highlighted by the risk-taking channel, whereby banks shift their funding to non-core interbank market sources at the expense of more stable retail deposit funding.¹²⁵

The secondary dynamics represented by the risk-taking channel of monetary policy transmission is also likely to be reinforced by a further decrease in the policy rate of interest – already there is evidence from economies experimenting with this policy that negative rates encourage the search for yield within the financial sector (Bech & Malkhozov, 2016, pp. 37-38) and as profits are squeezed, banks and other financial institutions, such as pension funds, begin to take on unwarranted risk to augment return on investment (McAndrews, 2015).

¹²⁵ What is crucial to consider here is not the total quantity of deposits in the aggregate banking system (which, as was explained previously, expands endogenously and cannot be reduced at will by banks), but the distribution of deposits amongst various groups of institutions, which reflects banks' decisions on funding structure. For instance, Federal Deposit Insurance Corporation (2016a) data reveals that there is a significant discrepancy between the funding structure of the largest financial institutions (which hold fewer deposits and a greater portion of uninsured deposits, while simultaneously holding riskier loan portfolios and less Tier I capital) than smaller financial institutions. A greater appeal of wholesale market funding risks exacerbating this inequality, thus threatening financial stability.

Needless to say, a policy that fails to positively impact lending and investment in production activities, promotes socially unproductive innovation, threatens the viability of an important segment of the non-bank financial sector and the profitability of the banking sector itself, thus promoting the accumulation of undesirable risk on banks', insurance companies' and pension funds' balance sheets and, on the whole, risks to backfire if banks respond by raising lending rates and insurance and pension funds by raising premiums, appears utterly unadvisable.

4.5 THE INCOME CHANNEL

Having considered from numerous angles the interaction of debt, credit and low interest rate monetary policy on the banking sector, we now turn to examine the *income channel*, sometimes referred to as the 'negative income effect',¹²⁶ which considers the impact of a protracted period of near-zero interest rates on the portion of the household sector that holds a net credit position and depends on income from securities holdings to maintain a desired level of consumption. In our analysis, we consider the income channel in the context of the household sector only for several reasons. Although the prolonged period of low interest rates and depressed earnings on interest-bearing securities have created significant complications for the non-bank financial players, such as pension funds and insurance companies, the consequences of these problematic dynamics within the financial sector are likely to be restricted to the financial sector itself in the short to medium term, with no evident direct impact on the level of production. The significant amount of literature investigating this subject concludes that these dynamics are similar to those considered in the risk-taking channel relevant for the banking sector (Altunbas et al., 2009; Antolin et al., 2011; Borio, 2011a; Dobbs et al., 2013, pp. 18-20; Gray, 2014, 2016; Hanson & Stein, 2015). The corporate sector, by contrast, has on the whole benefitted from low interest rates that have lowered the aggregate interest expense of the sector, thus improving earnings (Dobbs et al., 2013, pp. 15-16), although this has not induced corporations to invest in production activities, as discussed in the previous chapter.

Overall, the analysis of the income channel is constrained by the limited amount of attention afforded to this negative dynamics in the context of monetary policy transmission in academic and policy-making discussion, as well as theoretical and empirical literature,

¹²⁶ Yet another name for this channel is the 'negative wealth effect'. Analysis of this channel of monetary policy transmission is distinct from the analysis of the interest rate channel in that, while the latter looks at the initial effect of a *change* in interest rates on consumption behaviour via a number of different avenues, the former considers the narrow effect on consumption of a *prolonged* period of low returns to fixed income investments.

particularly of the post-Keynesian tradition.¹²⁷ An additional dimension of complexity resides in the need to disentangle the first-order effects of the central bank's lowering of interest rates, represented predominantly by the interest rate channel, concerned with the initial impact of such policy on consumption, and the second-order effects of a persistence of low-interest rates, beyond the point where the initial effects have subsided.

An important volume of literature studies the impact of a *decline* in interest rates on household balance sheets and incomes, particularly via the mortgage market, finding that those consumers who are able to benefit from a decline in mortgage rates (that is, holders of adjustable-rate mortgages, or ARMs) tend to see an improvement in balance sheets and disposable income, which lessens the probability of default on debt and allows them either to deleverage or to increase the consumption of durables, predominantly automobiles (Di Maggio et al., 2014; Keys et al., 2014). However, for the US economy these positive effects on household consumption are minimal, given that only a small percentage of borrowers hold ARMs (Moench et al., 2010). Furthermore, the initial economic benefit of household refinancing at lower interest rates also appears to have worn off, as “tightening credit standards and the increasing number of mortgages with negative equity have limited the number of US households that have been able to take advantage of lower interest rates” (Dobbs et al., 2013, p. 21).

Nonetheless, a decade since the start of the crisis, low interest rate policy remains the norm, and while the effects of the *change* of circumstances for certain households may have diminished or disappeared, the *status quo* is not irrelevant to those who depend on financial income either exclusively or to supplement labour income. According to research by McKinsey Global Institute, the household sector (a net creditor) has lost significantly more in interest income than it has gained as a result of a lower interest expense (Dobbs et al., 2013, p. 20). The authors conclude that “[i]n the United States, compared with 2007, households’ net loss of interest income in 2012 was about \$55 billion, holding assets and liabilities at 2007 levels. From 2007 to 2012, they cumulatively experienced a loss of \$360 billion in net interest income, taking both interest rate and balance sheet changes into account” (p. 21). The latter figure considers the loss of interest income of insurance and pension plans, and hence must be treated with caution, as it does not represent income on which households depend for

¹²⁷ Most of the empirical work analysing the impact of low interest rates on the household sector is undertaken using mainstream macroeconomic models that contradict many of the assumptions inherent to the post-Keynesian theoretical framework adopted in this dissertation. See, for example, the thematically-relevant work of Coibion et al. (2012), who, however, consider the redistributive effects of “contractionary” and “expansionary” monetary policy on the household sector via policy-induced changes in the money supply and inflation.

current consumption, although it is plausible that the reduction in households' wealth positions as a result would induce them to cut consumption and increase savings for retirement.

It is also critical to note that the income effect varies significantly by age bracket, whereby the younger, more indebted, households have benefitted from low interest rates, and by income percentiles, with the richest 10 percent having borne the majority of the income loss, while the remaining 90 percent was largely unaffected (*ibid.*, p. 21). Research on the marginal propensities to consume has been generally inconclusive, with various estimation techniques yielding a wide range of possible estimates and, more generally, pointing to the significant variability in propensities to consume depending on age, income, indebtedness, liquid and illiquid wealth, perceived creditworthiness, and geographical location (Carroll et al., 2014; Di Maggio et al., 2014; Keys et al., 2014). Overall, much more research is needed to reach definitive conclusions on the aggregate effects of monetary policy on consumption via the income channel, and hence this subject provides an important and fertile area for future empirical research.

4.6 A COMMENT ON THE EXPECTATIONS CHANNEL

At this juncture, the mainstream formulation of the *expectations* (or *signalling*) *channel* is the only remaining theoretical channel that our hitherto analysis of monetary policy transmission has not covered in detail, although mention of expectations has appeared in the context of various formulations of central bank influence throughout the dissertation (in particular, see section 2.6.3; an alternative view on the role of expectations in central bank policy is presented in section 5.4). The role of expectations in monetary policy transmission has a long history of thought in traditional classical analysis (see, for example, Muth, 1961, and Sargent & Wallace, 1975) and has received renewed attention in the context of recent events and the Fed's adoption of explicit forward guidance (Meier, 2009; Boivin et al., 2010; Gagnon et al., 2010; Levin et al., 2010; Christensen & Rudebusch, 2012; Del Negro et al., 2012; Bauer & Rudebusch, 2013; Das, 2014; Charbonneau & Rennison, 2015; Claus & Dungey, 2015; Lutz, 2015; Marfatia, 2015; McKay et al., 2015).

According to existing theory, the central bank may exert some degree of influence over economic activity via three possible avenues in the context of the expectations channel: (1) policy statements can be used to influence inflationary expectations; (2) forward guidance may be used to manage expectations on the future path of policy rates of interest; (3) and

explicit statements and implicit information contained in policy decisions may send strong signals of a central bank's commitment to provide further stimulus to the economy, thereby improving consumers' and investors' confidence in future economic prospects and encouraging consumption and investment.

It is the author's view that there is insignificant value in a detailed examination of these hypothetical channels of monetary policy transmission. Criticism of the first point would be redundant, as the view that monetary policy controls inflation in a mechanical manner has been rebuked throughout the dissertation (in particular, see sections 1.13, 1.14 and 2.5), and, more generally, concern with inflation appears misguided after years of unprecedented monetary policy stimulus accompanied by below-target rates of inflation in the United States (see Exhibit 5 and related discussion). Likewise, the second theoretical avenue of transmission is highly objectionable, given our previous argument that there is a general consensus (whether accurate or not) that interest rates will remain at low levels for the indefinite future (with statements to the contrary causing negative reactions in financial markets), and hence minimal scope to 'surprise' market participants with commitments to maintain the policy rate at low levels¹²⁸ (Bauer & Rudebusch, 2013, p. 24). In other words, commitment to persistent low policy rates of interest has created the corresponding expectations for the continuation of this policy, with any suggestion of its reversal causing significant upheaval in financial markets (Mackintosh, 2014; *Financial Times*, 2016; Platt, 2016).

The third and final theoretical avenue of monetary policy transmission via the expectations and signalling channel is more elusive to precise definition and systematic analysis, but appears entirely unpromising given the growing perception that monetary policy has run out of potential to influence production (Dianova, 2015b, p. 215). Anecdotal evidence provides a curious illustration of the change during the last ten years in the perception of market participants and economic commentators on the role of monetary policy in the ongoing global recession. In an informal experiment, we reviewed dozens of *Financial Times* articles responding to a search using three key terms ('Federal Reserve', 'monetary policy', and 'central bank') for the time periods 20th August – 6th September 2005 and 20th August – 6th September 2016, covering the time period of approximately one week before and one week after the influential Jackson Hole symposium on central banking held on the 25th – 27th of August in both years. The goal of the investigation was to draw a comparison between the

¹²⁸ On the nature and the effects of monetary policy 'surprises' see Claus & Dungey (2015) and Lutz (2015). On the law of diminishing returns to monetary policy statement surprises see Borio & Disyatat (2009).

general perception (as represented by one of the most influential, distinguished and widely-read financial newspapers) of monetary policy's effectiveness in achieving its objectives, by contrasting the quantity of statements expressing disillusionment with monetary policy or underscoring its limits in the 2005 versus the 2016 selected timeframe. The concurrence of the search time period with the Jackson Hole symposium was instrumental in that around the time central bankers and academics discuss issues most central to the sphere of central banking, one could expect the news coverage of the subject to be relatively extensive.

Not surprising was the general absence of negative statements on monetary policy effectiveness in the earlier time period, with the exception of one statement warning readers "not to exaggerate the [BoE]'s influence on the economy" (Giles, 2005, Internet), and the overwhelming number of positive statements describing market participants as believing that "the US central bank will always step in to rescue the economy and financial markets when they falter" (Coggan, 2005, Internet). By contrast, reference to monetary policy ineffectiveness was frequent in the latter time period: eleven of the most poignant and telling quotes are listed in Table 2 of the Appendix and suggest that "[l]oose monetary policy cannot produce productivity growth – the single most important factor in increasing a society's wealth. It cannot stimulate long-term demand growth. But it can distort markets, punishing anyone who is responsibly trying to plan for future obligations" (Staudt, 2016, Internet). The thorough analysis of 21 theoretical channels of monetary policy transmission undertaken in this dissertation supports this explicit, far-reaching, and comprehensive statement.

Recalling the premises of the 'lean versus clean' debate, it is now possible to offer an informed, substantiated assessment in favour of the perspective that views as fundamental a prevention of the accumulation of imbalances, in the context of the severity and length of the Great Recession, and the findings of our research effort that bring us to the conclusion that beyond its role of lender of last resort, the central bank does not have the potential to stimulate economic growth in the post-financial-crisis period characterized by weak demand on the market for produced goods, low productivity growth, voluntary deleveraging, liquidity hoarding, and general pessimism on economic prospects of the foreseeable future.

5 BEYOND THE ERA OF STAGNATION: THE ROLE OF CENTRAL BANK POLICY IN ENDOGENOUS GROWTH DYNAMICS

“Choose to be optimistic, it feels better.”

-- Dalai Lama XIV¹²⁹

When Stock and Watson (2002), in their influential paper entitled “Has the business cycle changed and why?”, examined the standard deviation of annual GDP growth rates in the United States using over four decades of data, they termed the latter two decades the “great moderation”. This bodacious term was quickly transformed into a proper noun, and the Great Moderation, characterized by subdued volatility of activity in the production economy and persistently low rates of inflation, became the economic policymakers’ buzzword of the decade. The phenomenon was ascribed to an important degree to the success of monetary policy in taming the business cycle (Bernanke, 2004), and reinforced amongst the (mainly mainstream) economic optimists the view that the US economy has entered a (permanent, according to the hyper-optimists) era of economic prosperity and stability.

In the years that followed the outbreak of the 2008 financial crisis, acute optimism in the economics arena appeared a rare affliction. This is in itself a major problem, whereby the lack of optimism is one of the explanatory factors of weak economic growth in the post-crisis period within our theoretical framework, which embraces the importance of complex dynamics, reflexivity, ontological uncertainty, and the subjective, irrational process of expectations formation, and which describes economic growth as an endogenous and path-determined phenomenon (see section 2.6).

Even before the onset of the financial crisis in 2008, not all economists were unequivocally optimistic on the future of the US economy. Amongst those dutifully reinforcing the reputation of economists as the ambassadors of the dismal science were a number of post-Keynesians, whose pre-2008 academic writing featured a negative appraisal of certain macroeconomic trends stemming from the influence of financialization, globalization, deregulation, and the dominance of the central bank inflation-targeting paradigm, the mainstream’s poster children during the Great Moderation. Amongst the most notable heterodox economists of such pessimistic conviction, the theoretical constructs of which have received empirical support in the decade since the financial crisis, are Godley

¹²⁹ Quoted in Brandreth, G. (2013), “7. Be happy”, *The 7 Secrets of Happiness*, ebook, available at: www.amazon.co.uk, accessed 26 April 2017.

(1999), Cencini (2001), Epstein (2002), Lavoie (2007), Palley (2007) and Rossi (2007), though as we will see throughout the chapter, numerous others have contributed to our understanding of the economic forces which eventually led to the financial and economic calamity of 2008 and the prolonged period of stagnation thereafter.

We have thus far contributed to this field of research by providing a critical appraisal of the theory and empirical evidence of monetary policy transmission, offering a structured and meticulous exposition of the inadequacy of monetary policy tools in stimulating US economic growth in the decade following the financial crisis. In this chapter we build a theoretical framework for understanding post-crisis stagnation and domestic economic growth determinants which hold the potential to counter the forces of this phenomenon. We rely on the theoretical and empirical findings of Chapters 1-4 to delineate the dynamics of monetary policy transmission within the context of both stagnation and growth regimes, with the ultimate purpose of drafting definitive recommendations for the implementation of interest rate, quasi-debt management/credit policy and macroprudential regulation in future.

Our approach to this task is as follows. In section 5.1 we present a number of competing mainstream theories that have been used to explain the prolonged stagnation of the US economy, revealing their theoretical flaws and consequent inability to explain the failure of monetary policy to efficiently and effectively draw the economy out of recession. In section 5.2 we develop an alternative framework, capitalizing on the theoretically expounded and empirically affirmed household/corporate sector dynamics, from our work in Chapter 3, and a number of innovative and highly relevant strands of growth theory, which in symbiosis reveal the possible vicious/virtuous cycles of economic activity in the production economy, suggesting the importance of a well-formulated policy approach in determining the future of the US economy. In sections 5.3 and 5.4 we draw our analysis to a close by elaborating and concluding on the precise nature of what has earlier been referred to as ‘the paradox of monetary policy (in)effectiveness’ and end by presenting in the, now complete, alternative framework for the analysis of monetary policy implementation a recommended approach for the use of interest rate, expectations management, quasi-debt management, credit and regulatory policies.

5.1 THE CAUSES OF POST-CRISIS STAGNATION: A CRITICAL APPRAISAL

Our hitherto analysis of monetary policy transmission channels on the basis of heterodox theory has offered a solid theoretical account of why monetary policy was predestined from

the start of the post-crisis recovery period to fail in its explicit goal of stimulating the US economy, returning it as swiftly as possible to the GDP growth and employment rates of the Great Moderation decades. When examined within the framework of post-Keynesian monetary theory, the inefficacy of low interest rate, quasi-debt management and credit policy, as it was employed in the post-2008 crisis period, is predictable, explicable and theoretically coherent, but such an examination is notably incomplete in the absence of alternative, theoretically more promising policy proposals. The critical task of drafting and justifying policy alternatives inevitably has as its starting point the elaboration of a theoretical framework for analysing and understanding the underlying causes of the weak economic growth that has plagued the United States since the recent financial crisis, a subject that is as fundamental as it is complex and wrought in controversy.

One of the few points of agreement amongst economists of varying theoretical conviction is that the post-2008 crisis recovery has been at best anaemic, justifying reference to this period as the Great Recession. Alvin Hansen (1939), in his Presidential address delivered to the annual meeting of the American Economic Association, brought centre-stage the concern of a possible prolonged period of weak economic growth and high unemployment, different in its nature and severity from normal economic fluctuation ascribed to the business cycle, popularizing the term ‘secular stagnation’ (p. 4). In the post-2008 crisis period, the debate on the nature and causes of secular stagnation has resurfaced, ignited by Lawrence Summers’s speech to the IMF Annual Research Conference in 2013, which set off a wave of predominantly theoretical research on the causes of the deep and persistent recession yielding an assembly of remedial policy proposals.

It is crucial to analyse briefly the constructs of the neoclassical definition of secular stagnation, as it has been instrumental in structuring the analysis of post-crisis monetary policy within mainstream circles. In particular, general acceptance of the New Keynesian secular stagnation framework has led to the view that this economic condition “undermines the most powerful and flexible tool we have for keeping growth near its potential rate – standard monetary policy” (Teulings & Baldwin, 2014, p. 15). Reinforcing our previous conclusions, presented in Chapters 3 and 4, that monetary policy is, by nature and not by circumstance, unable to determine the rate of growth of the production economy, requires a thorough understanding of where the neoclassical constructs on stagnation are misleading and misguided.

Teulings and Baldwin (2014) succinctly classify the views emanating from the mainstream debate on secular stagnation into a “three-pillar framework for thinking about an

economy's future growth" (pp. 3-4). The first pillar, which represents the most widely ascribed-to view on the causes of stagnation within the mainstream theoretical camp, is that expounded by Summers in the 'secular stagnation hypothesis', elaborated on and fine-tuned in a number of publications since 2013 (see Summers, 2014a, 2014b, 2015). While there is no absolute consensus in mainstream economics on the exact nature of and the appropriate cure for this economic condition, there appears to be agreement amongst the mainstream economists within the 'secular stagnation hypothesis' camp on several fundamental points, which have important implications for policy formulation.

Crucially, it is held that one of the main causes of secular stagnation is a disequilibrium between the real interest rate and the sub-zero 'natural' (or equilibrium real) rate of interest, which in recent decades has been falling as a result of a number of structural changes in the economy; this disequilibrium occurs as a result of the zero lower bound, which prevents the nominal central bank-determined policy rate of interest from decreasing below a given threshold, and persistently low rates of inflation that prevent the real rate of interest from falling significantly below zero (Blanchard et al., 2014, p. 101; Summers, 2014a, p. 32). The result of this mismatch is an excess of savings over investment and a deviation of actual employment from full employment, a conclusion derived from the neoclassical understanding of the relationship between savings and investment based on the traditional IS-LM model and the neoclassical Phillips curve (see sections 2.5.1 and 2.5.2).¹³⁰

While there is no agreement on the causes of the (supposedly) problematic downward trend in the equilibrium real rate of interest, hypotheses abound. Given that the concept of a 'natural' rate of interest is entirely absent from the post-Keynesian theoretical framework on economic growth determinants developed hereafter, it is deemed beyond the scope of this dissertation to consider this subject in depth. It is, however, instrumental to point out that each explanatory factor falls into one of three categories, as described by Blanchard et al. (2014, pp. 102-103), in that it affects either the supply schedule for loanable funds (such as a declining population growth rate and rising income inequality), the demand for loanable funds (such as slower technological progress and a decrease in the price of capital goods), or the relationship between the demand for safe and risky assets, as determined by investor risk and liquidity preferences.¹³¹ In the mainstream view, an inward shift of the investment demand curve accompanied by an outward shift of the savings demand curve results in a fall

¹³⁰ For an example of a New Keynesian quantitative approach to the estimation of the 'natural' rate of interest see Holston and Laubach (2016).

¹³¹ For an elaboration of the latter view see Caballero and Farhi (2014).

in the equilibrium real rate of interest (Eggertsson & Mehrotra, 2014, p. 125; Summers, 2014b, pp. 69-70).

Supporting the general thesis of the secular stagnation hypothesis and elaborating on it further, Koo (2014) argues that a financial crisis, particularly the bursting of a financial bubble, causes a ‘balance sheet recession’, whereby large-scale deleveraging results in an accumulation of loanable funds in the financial sector that are “unable to re-enter the real economy” (p. 132). Monetary policy is ineffective because even at near-zero interest rates, the private sector continues to deleverage rather than to borrow. Even after the period of deleveraging is complete, the real interest rate remains permanently negative (Blanchard et al., 2014, p. 109; Eggertsson & Mehrotra, 2014, p. 3), and corporations and households suffer from a ‘debt-related trauma’ that prevents them from increasing their borrowing for consumption and investment (Koo, 2014, p. 137). Without the intervention of policy to increase the natural rate of interest or to lower the real rate of interest, the period of stagnation persists indefinitely.

In the context of the secular stagnation hypothesis and the theory of balance sheet recessions, the ineffectiveness of monetary policy is thus viewed as a circumstantial (non-permanent) condition linked to a sub-zero ‘natural’ rate of interest and the effective lower bound on the policy rate of interest, as well as continuing weak credit demand, rather than an inherent characteristic explained by the misspecification of transmission channels in mainstream theory (see Chapters 3 and 4). These hypotheses are fundamentally at odds with the post-Keynesian theoretical framework on a number of crucial constructs, including the existence of the ‘natural’ rate of interest/employment (see section 1.5), the savings-create-investment and loanable funds views (see section 4.2), the belief in monetary policy’s ability to control inflation¹³² (see sections 1.13 and 1.14), and the confusion of an aggregate preference for liquidity in the face of economic uncertainty and weak aggregate demand (see section 2.6.2) with a ‘savings glut’, which erroneously implies that savings are being ‘withheld’ from valid investment opportunities, depressing the economy’s actual growth rate.

Policy recommendations emanating from this theoretical camp are several and, while some are generally in line with the proposals derived from a post-Keynesian framework, all are founded on the misleading and erroneous theory described above (see detailed discussion in Hein, 2015, pp. 6-8). For example, Teulings and Baldwin (2014, p. 16) suggest stimulating

¹³² Belief in the potential effectiveness of ‘anti-stagnation’ policy designed to lower the real rate of interest by increasing actual inflation is solidly based on the premise that “[h]istory has shown that monetary policy can stop inflation” (Teulings & Baldwin, 2014, p. 18). A reversal of policy thus ‘guarantees’ a return to lower rates of inflation whenever it is deemed that the economic growth objective has been successfully achieved.

innovation to increase labour productivity and to raise labour input, a generally noble goal, but with the ultimate aim of policy being to raise the ‘natural’ rate of interest, thus returning savings and investment to equilibrium and reinstating the effectiveness of central bank interest rate policy. Policy expected to effectively lower the real rate of interest involves significantly increasing the inflation target (Eggertsson & Mehrotra, 2014, p. 127; Teulings & Baldwin, 2014, p. 18) to overcome the so-called ‘timidity trap’ (Krugman, 2014, p. 66), which stalls the process of re-leveraging. Alternatively, Summers (2014a) suggests employing social policy measures designed to increase consumer spending and to facilitate business investment, or increasing the intensity of credit and quasi-debt management policy for a more direct stimulation of borrowing and spending/investment (p. 38), and higher rates of inflation (Claeys et al., 2014, Internet). Summers (2014b) also argues for the use of fiscal policy to channel “unborrowed savings” to productive uses, thereby increasing aggregate demand (p. 134).¹³³

Although the essential aim of such policy, namely, to stimulate an unresponsive economy by raising aggregate demand and supply, is pertinent and synchronous to the objective of post-Keynesian prescriptions as interpreted in this dissertation, it is derived from an inaccurate theoretical framework for analysing the causes of economic stagnation and growth determinants, and hence the policy recommendations are theoretically unfounded and in some cases inadequate. One policy proposition emanating from the ‘low natural rate of interest’ camp is particularly problematic. Specifically, the view that macroprudential regulation should not be used to prevent the inflation of asset bubbles is entirely incongruous with the theoretical framework developed in this chapter, which, as we will see, suggests that, on the contrary, macroprudential regulatory reform is one of the key elements in addressing successfully the stagnation dilemma in the future. Within the mainstream perspective, the inflation of ‘rational’ asset bubbles is viewed as a potentially effective, necessary mechanism for “balancing the supply and demand for loanable funds” (Teulings & Baldwin, 2014, p. 14) and, more generally, policy aiming to eliminate the ‘excess savings’ problem is in most cases viewed as incompatible with policy designed to increase financial stability (Summers, 2014a, pp. 32-33). Clearly, a policy framework that aims to successfully address the problem of stagnant economic growth while simultaneously ensuring progress towards enduring financial stability is at least theoretically superior to the assembly of disjointed policy

¹³³ Although consideration of fiscal policy is beyond the scope of this study, the importance of its role in growth dynamics is undeniable. For an astute post-Keynesian model considering the role of fiscal policy in promoting growth in a monetary production economy see Terzi (2016).

proposals emanating from the adherents of the ‘excess savings’ camp of mainstream economics.

The second ‘pillar’ of the mainstream debate on the causes of secular stagnation is centred on the view that the economy’s exogenously-determined, long-run natural or potential growth rate, a canonical neoclassical concept (discussed and reformulated in section 2.6.1), has permanently decreased (Gordon, 2014), suggesting that actual growth rates of the economy are the ‘new norm’, rather than a deviation of actual growth from potential. Gordon (2014) ascribes this slowdown to four “headwinds” affecting the supply side of the economy, namely, an ageing population, educational stagnation, rising inequality and a growing public debt burden (pp. 50-51). He argues that the gap between the potential and actual economic growth rates is, in fact, shrinking, with the implication that policy aiming to stimulate aggregate demand and to raise actual growth rates towards potential is bound to fail. Supply-side policy measures aiming to increase the steady state GDP growth rate are proposed, and include investment in physical infrastructure and human capital, as well as other ‘free-market’ measures within the labour market and business sector (Teulings & Baldwin, 2014, p. 17).

While some of the suggested measures are likely to positively affect aggregate demand and hence output, others would act negatively on demand-side dynamics. This is seen by proponents of this perspective as an inconsequential side-effect, as in the neoclassical framework actual GDP growth rates inevitably gravitate to potential growth rates (with the appropriate implementation of monetary policy), and potential growth rates are an exogenous variable that is “more or less independent of aggregate demand dynamics” (Hein, 2015, p. 9). Considerations of the role of the financial sector, the consequences of debt-driven growth dynamics, the importance of financial stability and the endogeneity of potential growth rates of the economy are entirely absent from this strand of analysis, where monetary policy has no role to play in determining the long-term rate of economic growth, since potential output is considered to be beyond its sphere of influence.

The final pillar of the Teulings and Baldwin (2014) categorization focuses on the level of the potential economic growth trajectory, rather than the actual or potential growth rates, and is linked to a strand of economic growth theory that underscores the impact of labour market hysteresis on the equilibrium level of GDP growth. The effects of hysteresis are evident, argues Glaeser (2014), as “[s]ome fraction of the recessionary joblessness rise has become permanent after almost every post-1970 downturn” (p. 74), hitting the less skilled

workers hardest and resulting in a trend of human capital erosion.¹³⁴ Furthermore, as underscored by Glaeser et al. (2015), “the largest shortfall relative to the prerecession trajectory [has] been in trend labor productivity” (p. 72). Within the neoclassical strand of research on hysteresis, the focus is on supply-side developments and the effects on the production capacity of the economy. Crucially, effort has recently been made to model aggregate supply as endogenous to aggregate demand dynamics (Reifschneider et al., 2015).¹³⁵

Although this analytical approach brings the mainstream one step closer towards the appreciation of the endogeneity and path-dependency of economic growth, a concept that has long been the centrepiece of heterodox economic analysis (see section 2.6.1), the policy recommendations that have emerged from this neoclassical body of literature are disjointed and unconvincing. Casting aside the possibility that the damaging effects of hysteresis are permanent and irreversible (a possibility raised, for example, by Ball (2014, p. 159),¹³⁶ which suggests that policy effort would in all scenarios be fruitless), prognosis for policy success appears tentative at best. Glaeser (2014, pp. 77-78) and Ball (2014, p. 159) advocate the importance of educational reform and government infrastructure investment in addressing the problem of labour force participation rates, while a more radical perspective of Reinhart and Rogoff (2014) advocates that developed countries suffering from persistent stagnation need to apply more extreme policy measures, recently relegated to emerging economies, including debt restructuring, higher inflation, capital controls and “other forms of financial repression” (p. 55).

Consideration of the specific role of monetary policy and macroprudential regulation is generally absent from the discussion, with the exception of Reifschneider et al. (2015), who propose that the existence of hysteresis presents possible benefits from a more aggressive monetary policy to boost aggregate demand, though such an approach would depend on the expected efficacy of monetary policy transmission and should be counterbalanced against the risks of increasing financial instability (p. 102).

¹³⁴ Glaeser offers two explanations as to why the less skilled struggle to re-enter the labour market. First, he argues that the increase in public unemployment insurance benefits has made less skilled labour “too expensive relative to more mechanised alternatives” and second, he argues that a gradual marginalization of less skilled labour inputs in the modern productive economy has occurred (p. 76).

¹³⁵ See also Summers (2014a, p. 37) and Ball (2014) for an endorsement of this view.

¹³⁶ Ball (2014) suggests that hysteresis in the unemployment rate is at least partially reversible (pp. 159-160) and believes that appropriate policy that creates a boom in economic activity “might at least reverse declines in the *growth rate* of potential [output]” (p. 160).

5.2 ECONOMIC STAGNATION AND GROWTH THEORIES FROM A HETERODOX PERSPECTIVE

In this section, we present an alternative theoretical framework based on post-Keynesian theory for interpreting and analysing the Great Recession and the inefficacy of monetary policy in its aim to end this prolonged period of stagnation. Many of the ideas produced by the mainstream ‘secular stagnation’ debate will be instrumental to our analysis, but it will become evident how the use of a post-Keynesian theoretical framework, which underscores the importance of aggregate demand as the determinant of economic growth, drastically alters the conclusions on the causes and the precise nature of the current stagnation, as well as the remedial policy actions that this condition warrants. In the context of the proposed theoretical framework we discuss the role of interest rate policy, quasi-debt management and credit policy, and macroprudential regulation, offering concrete policy recommendations with regards to each.

To start, we delineate a threefold characterization of the dynamics that have produced the necessary conditions for what we shall refer to as a post-crisis stagnation phase,¹³⁷ based on the following structure: (1) *Long-term structural dynamics* (many of which have been highlighted and verified by post-Keynesian as well as mainstream economists) have eroded economic resilience, impacting the ability of aggregate demand to recover from a recessionary period. (2) The financial crisis has inflicted significant damage on the US economy and has resulted in *post-crisis dynamics* that act to depress aggregate demand via a number of channels. Owing to the economic changes we attribute to the long-term structural dynamics, aggregate demand is struggling to recover in the absence of appropriate policy action. (3) *Financialization dynamics* have created a debt-driven economy characterized by a continuous Minskyian debt cycle punctuated by financial crises that have detrimental effects on aggregate demand, as per point 2, and are followed by anaemic recoveries, resulting from the long-term structural dynamics described in point 1. We conclude that the stagnation phase is likely to end with the beginning of a new (temporary) debt-driven consumption boom that will subsequently end in a systemic financial crisis, which, in turn, will be followed by a protracted period of stagnation, but that a drastic revision in the approach to monetary policy formulation promises to promote a fundamental shift in consumption and investment dynamics, producing a more enduring and sustainable rate of economic growth.

¹³⁷ We abstain from the terms ‘stagnation trap’ and ‘secular stagnation’ as both suggests a state of permanence or at least extreme persistence, characterizations which our theoretical framework does not support.

5.2.1 LONG-TERM STRUCTURAL DYNAMICS

The importance of long-term structural changes in determining economic growth dynamics is recognized by both mainstream and heterodox economists. As we have seen in the secular stagnation hypothesis, trends such as a declining population growth rate and rising inequality are used to explain changes to the supply and demand for loanable funds, and this is believed to negatively affect actual economic growth rates, which remain indefinitely below potential. In an alternative mainstream view, such changes are perceived as more permanent in nature, negatively impacting potential or long-term equilibrium GDP growth rates in a possibly irreversible way. Similarly, from the labour market hysteresis perspective, negative trends in labour market participation and employment rates have a detrimental impact on long-term potential growth rates, though this view focuses on the level of the growth trajectory of the economy, rather than changes in the rate of potential growth.

In our framework, the concept of potential economic growth rates merits a significant re-interpretation, a crucial starting point to our analysis, given that ‘potential’ output estimates are used in the calculation of the ‘output gap’ and hence are central to monetary policy formulation within the current framework (see section 2.5.1; Alich, 2015, p. 3). In fact, what neoclassical economists refer to as ‘potential’ growth rates would be more appropriately referred to as ‘long-term trend’ growth rates, a conclusion that appears clearly justifiable when one considers the methodology that is used for their estimation (Ball, 2014, p. 150).¹³⁸ In the famous words of Kalecki (1968, p. 263) “the long-run trend is but a slowly changing component of a chain of short-period situations; it has no independent entity”, whereas the definition of ‘potential’ is inevitably related to the future and implies a promising possibility yet unrealized.

A more appropriate definition of potential economic growth rates would therefore be forward-looking and ideological, if impossible to calculate with any amount of precision, and based on a presumption of, for example, zero involuntary unemployment or underemployment and improving, rather than deteriorating, rates of labour force participation. Clearly, some of the inputs necessary for this theoretical estimation approach are elusive to any form of extrapolation (technological innovation being a case in point), and

¹³⁸ Although there exists a variety of statistical approaches to calculating the hypothetical rate of potential GDP growth, most involve the input of trend data of key variables, such as labour force participation rates, unemployment rates and hours worked, as well as capital stock and total factor productivity (Alich, 2015).

furthermore, the economy may never actually reach such a state (see section 2.5.3).¹³⁹ Hence, in this formulation, the concept of potential economic growth remains abstract, ideological and dependent on highly-subjective estimation. However, what is far more essential for the discussion at hand is the recognition of future growth rates of the economy as endogenous and path determined, and it will become evident throughout the discussion in this section that a coherent and effective theoretical framework for understanding stagnation and the role of policy in economic growth dynamics can be elaborated without the reliance on the concept of an exogenously-determined, calculable potential rate of growth.¹⁴⁰

In our heterodox evaluation of long-term structural changes and their impact on actual and future economic growth, aggregate demand figures centre stage, much as it did in the analysis of monetary policy transmission channels in the previous chapters. As such, it is generally held by post-Keynesian economists that both actual and potential (abstracting, momentarily, from the precise definition of the term) economic growth rates are ultimately determined by aggregate demand, in that supply-side production, investment, technological innovation, as well as labour force participation, are determined by the corporate sector's evaluation of effective demand, as argued previously (see section 1.3; Onaran, 2016, p. 7; Zorn, 2016, p. 14). Opportunely, recent New Keynesian empirical work is also moving in this direction (see Reifschneider et al., 2015; Benigno & Fornaro, 2016).

The subsequent evaluation of long-term structural dynamics, which have rendered the US economy less resilient and prone to remain trapped in post-crisis periods of stagnation, inevitably focuses on the negative impact of a number of important macroeconomic trends on aggregate demand, namely, a falling wage share, growing sectoral imbalances and rising income inequality. Our consideration of these trends is brief, largely because they have received such significant theoretical and empirical support in both mainstream and heterodox literature.

The empirically documented trend of rising income inequality in the United States since the 1980s is one of the negative dynamics that have contributed to a persistent fragility of aggregate demand. As a number of heterodox economist have noted (Godley, 1999; Palley,

¹³⁹ To this end, Zorn (2016, p. 13) provides the example of Canada, where the capacity utilization as a percentage of productive capacity is estimated to have been between 70 percent and 90 percent in the 1987-2014 period.

¹⁴⁰ While the hysteresis view, as described previously, makes an important contribution to our understanding of current stagnation trends in that it underscores the endogeneity of future growth rates of the economy, it, too, relies on the concept of 'potential' growth to frame our understanding of the economy's productive possibility and to suggest possible irreversibility of negative trends. This is linked to the dominant neoclassical conviction of the importance of the supply side in determining total economic output, with 'excess' aggregate demand merely resulting in rising rates of inflation (Alichi, 2015, p. 4).

2007; Cynamon & Fazzari, 2015; Blecker, 2016), pre-crisis debt dynamics, specifically, debt-driven rather than income-driven bouts of consumption spending, have obscured this trend in statistical analyses (see, for instance, the empirical work of Barba and Pivetti (2009, pp. 123-125) and Stockhammer and Wildauer (2016, p. 1628); we elaborate on this subject in the context of the theory on income producing versus income consuming bank-financed expenditures in section 5.2.3).

Renewed interest in the subject in the post-crisis period has, however, produced additional empirical evidence of the trend's existence (Cingano, 2014; Stone et al., 2016) and coherent, convincing explanations for its causes. More precisely, Köhler et al. (2015) find evidence that an increasing reliance of households on debt-driven consumption and the pre-crisis trend of financial deregulation contributed in an important way to growing income inequality. This trend is self-perpetuating, in that the increasing role of debt in the economy is causing greater income inequality by transferring income from "high marginal propensity to spend debtors to lower marginal propensity to consume creditors, and this process of transfer can generate business cycles" (Palley, 2007, p. 17), with a negative impact on aggregate demand and business investment, which reinforces the debt cycle and causes a further deterioration in personal income distribution (Cynamon & Fazzari, 2008, 2015; Barba & Pivetti, 2009; Onaran, 2016, pp. 5-7). Post-crisis monetary policy, with its reliance on near-zero interest rates and unprecedented in scope quasi-debt management and credit policy, in the medium term promotes the debt cycle and thus exacerbates the problem of deteriorating income distribution, inevitably contributing to the persistence of weak GDP growth, the very problem it aims to address (see sections 3.1.1 and 5.2.3).

The importance of sectoral imbalances in the development of negative macroeconomic dynamics, which help to explain the severity and length of the Great Recession, is likewise undeniable. On the basis of an analysis of what he referred to as the 'seven unsustainable processes', Godley (1999) was able to predict the financial crisis and the Great Recession nearly a decade before its occurrence. Godley's prediction was founded on seven long-term trends characterizing the US economy, namely: (1) a persistent fall in private savings into negative territory, (2) a corresponding increase in debt of the private sector, (3) a consequent increase in the stock of endogenous money, (4) an increase in the value of assets unmatched by the rate of increase in profits, (5) the rise in the government budget surplus, (6) the rise in the current account deficit, and (7) an increase in the net foreign debt to GDP levels of the United States (pp. 4-5). In other words, in the domestic sphere Godley observed a persistent trend of debt-driven overspending, as compared to income, by the private sector,

which was contributing to a continuous increase in aggregate leverage in the economy, the simultaneous inflation of asset bubbles, and a critical underspending by the government sector.¹⁴¹ Armed with these observations, Godley (1999) made his far-seeing prediction: “If, as seems likely, private expenditure at some stage reverts to its normal relationship with income, there will be, given present fiscal plans, a severe and unusually protracted recession with a large rise in unemployment” (p. 3). Godley emphasized the importance of increased fiscal spending, particularly during a period of recession, and understood that monetary policy would be powerless to stimulate economic growth, “except temporarily and perversely by giving a new lease on life to the stock market boom” (p. 4), much as we concluded in the previous chapters. With regards to fiscal policy, Godley correctly argued that “the government’s fiscal operations, through their impact on disposable income and expenditure, play a crucial role in determining demand and output” (p. 4), a perspective that has been reiterated with renewed force by a number of other post-Keynesian economists in the context of a decade of stagnant growth in the United States and the European Union (Hannsgen et al., 2013; Hannsgen et al., 2015; Terzi, 2016).

The final well-documented macroeconomic trend we consider, a trend that has had an important impact on economic growth prospects in the United States, is the shift in functional income distribution from wages to corporate profits since the 1970s (Palley, 2007, pp. 12-13; Rossi, 2011a, pp. 68-69), originally highlighted as a highly problematic dynamics by Kalecki (1972, chapter 5), who speculated on the negative implications of a falling wage share on consumption and investment (Asimakopulos, 1975, pp. 329-333). A significant volume of heterodox empirical work has confirmed the existence of a wage-led demand regime in the United States as well as the negative impact that the shift in functional income towards profits has had on economic growth (Hein & Vogel, 2008; Onaran & Galanis, 2014; Stockhammer, 2015; Stockhammer & Wildauer, 2016).

Furthermore, a meticulous econometric study conducted by Stockhammer (2015) has confirmed the lack of a reliable link between profits (which have benefitted significantly from a prolonged period of low policy rates of interest) and investment (p. 15), supporting the conclusions of earlier theoretical (Menz, 2007, p. 14) and econometric (Chirinko, 1993, p. 1881) work on the subject, of our discussion on the complexity of investment decision making under ontological uncertainty (see section 2.6.2), on the disconnect between low

¹⁴¹ Discussion of the international imbalances that Godley, and later other economists at the Levy Economics Institute, documented and analysed remain outside the scope of this dissertation. Relevant sources for an elaboration on this subject are Godley (1995), Dos Santos et al. (2005) and Hannsgen et al. (2015).

policy rates of interest and debt-backed corporate borrowing, and thus, more generally, on the ineffectiveness of interest rate policy transmission via corporate investment channels (see section 3.1.1).

5.2.2 POST-CRISIS DYNAMICS

The dynamics within the second category of our framework are of a more recent origin, relating to the post-crisis period, and are the result of the damage inflicted on the US economy by the financial calamity of 2008. These post-crisis dynamics act to depress aggregate demand via several channels discussed hereafter, and, combined with a more fundamental, long-term fragility of aggregate demand considered previously, have created the necessary conditions for a prolonged stagnation phase. The idea that economic downturns inflict a permanent loss in output is not new even to mainstream literature (see, for instance, Summers & Blanchard, 1986), and has received recent empirical support, with Benigno and Fornaro's New Keynesian framework, where economic growth is modelled as endogenous and path dependent, being a prime example (2016, p. 22).

Koo's (2014) definition of the post-crisis period of stagnation as a balance sheet recession and Krugman's (2014) ascription of the weak consumption trend during this phase as a 'timidity trap' indeed have some validity, as both characterizations accurately describe the deleveraging period that lasted for approximately 6 years following the crisis (see sections 3.1.1 and 3.1.2 as well as Exhibits 13 and 15), during which debt-driven consumption was subdued by recent standards. However, as we will argue in section 5.2.3, the deleveraging phase was bound from the onset to be temporary and to reverse with the start of a subsequent debt-driven consumption upswing, which, though slow in coming, is beginning to show in empirical data. The Koo/Krugman framework is also inadequate in its view that, as a result of the process of desired deleveraging, loanable funds are accumulated in the financial sector and are withheld from productive uses (consumption and investment) within the 'real' economy. In section 5.2.3 on financialization dynamics we will offer more appropriate explanations for the increasing importance of the financial sector in recent decades in the context of the endogenous money view, where loans granted for production activities create bank deposits (see section 1.10), rather than representing a mechanism for the distribution of savings to the production economy for investment.¹⁴²

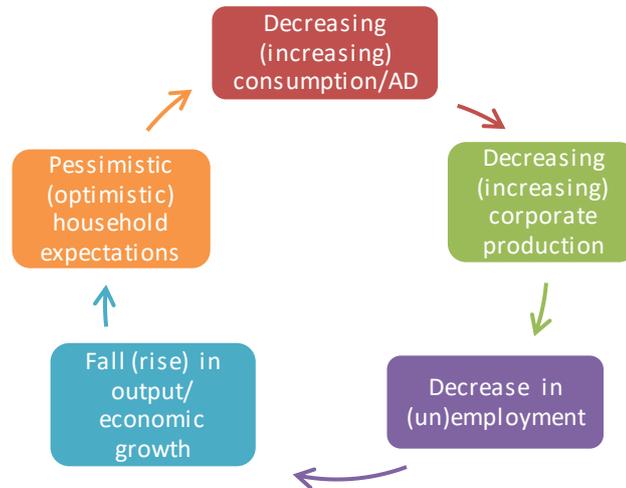
¹⁴² For a post-Keynesian explanation on the relationship between finance, investment, saving and debt see Davidson (1986), Arestis et al. (2016) and Terzi (2016).

A far more relevant channel via which post-crisis dynamics have acted to depress aggregate demand, with significant implications for future GDP growth as maintained by the hysteresis thesis, is the expectations channel (see section 2.6.2), the importance of which cannot be overemphasized in the post-Keynesian framework (Kregel, 1976). The state of households' negative expectations in future economic prospects, an evident reaction to a period of financial turbulence and a severe economic downturn, is self-propagating to the extent that pessimistic projections for future economic performance result in an increase in households' precautionary savings, weakening aggregate demand and leading to a fall in corporate production and investment, the volume of which is a function of firms' 'animal spirits' and the resulting evaluation of effective demand (see section 1.3; Kregel, 1976, pp. 210-211; Skott & Ryoo, 2008, p. 829). This, in turn, prolongs the period of stagnation, supporting households' initial pessimistic projections for economic growth, which are thus extended into future periods, acting indefinitely to suppress aggregate demand.¹⁴³

In the same way that expectations are critical to determining household consumption levels and consequently the volume of corporate output, which adjusts rapidly to meet increasing demand (Bhaduri, 2014, p. 4), so are corporate expectations fundamental to investment decision making (see section 2.6.2), while the level of capital investment is crucial to the determination of the rates of future economic growth (see section 1.8). Such is the recursive nature of growth determinants (see section 2.6.1), also famously described as a "circuit of cumulative causation" by Swedish economist Gunnar Myrdal (see detailed treatment of the theory in O'Hara, 2008), whereby, in the positive scenario, a rise in 'animal spirits' of the household and corporate sectors leads to increasing consumption, production, investment and economic growth, which reinforces initial positive expectations and improves fundamental growth prospects of the economy. It is, perhaps, most instrumental to describe the two major interdependent dynamics of the post-crisis period using a circular representation with a vicious/virtuous dichotomy, with one illustrating household consumption decisions and the other describing corporate investment decision making. The visual representation of the household expectations and consumption cycle described above takes the form shown in Exhibit 26.

¹⁴³ This vicious cycle of pessimism and underinvestment is fundamental to the post-Keynesian understanding of an economic decision-making process characterized by ontological uncertainty, where economic agents, aware of the limits of their knowledge, decision-making ability, and the predictability of future economic events, adjust their behaviour accordingly. Such behavioural adjustments are reflected in individuals' and firms' decisions on intertemporal budget allocation, particularly at times of increased economic or financial volatility, inducing increased saving, the hoarding of liquidity or the allocation of a greater portion of the current budget to insurance against risks of unfavourable future events.

Exhibit 26 Household pessimistic (optimistic) expectations-consumption cycle.



Source: author's elaboration.

Before presenting the somewhat more complicated cycle of corporate decision making, a number of issues are worth considering. In a stylized representation of individual decision making, households choose, at a given point in time, how much of their income to spend and how much to save, with the notable consequence of increased savings being a decrease in aggregate demand and thus corporate production, as described in Exhibit 26, and a bloating of the financial sector, as households invest their unspent income in financial assets, a dynamics we consider in the subsequent section. In a framework of endogenous money, the act of household saving does not directly impact corporate investment, as neoclassical theory erroneously contends. It is, instead, corporations' evaluation of households' current and likely future levels of expenditure that is critical to a firm's decision on how much and in what to invest.

The corporate pessimistic (optimistic) expectations-investment cycle is illustrated in Exhibit 27. The nature of corporate investment decision making and the role of investment in economic growth dynamics are the subjects of a vast and growing body of literature. It is beyond the scope of this dissertation to delve into the subject in detail, but a brief consideration is necessary for the subsequent evaluation of the role of monetary policy in promoting sustainable economic growth. As illustrated in Exhibit 27, corporations' evaluation of current and future aggregate demand is the determining factor in the decision to

invest in capital and R&D, the two types of investments that are fundamental to future productivity, employment, and the growth rates of output.

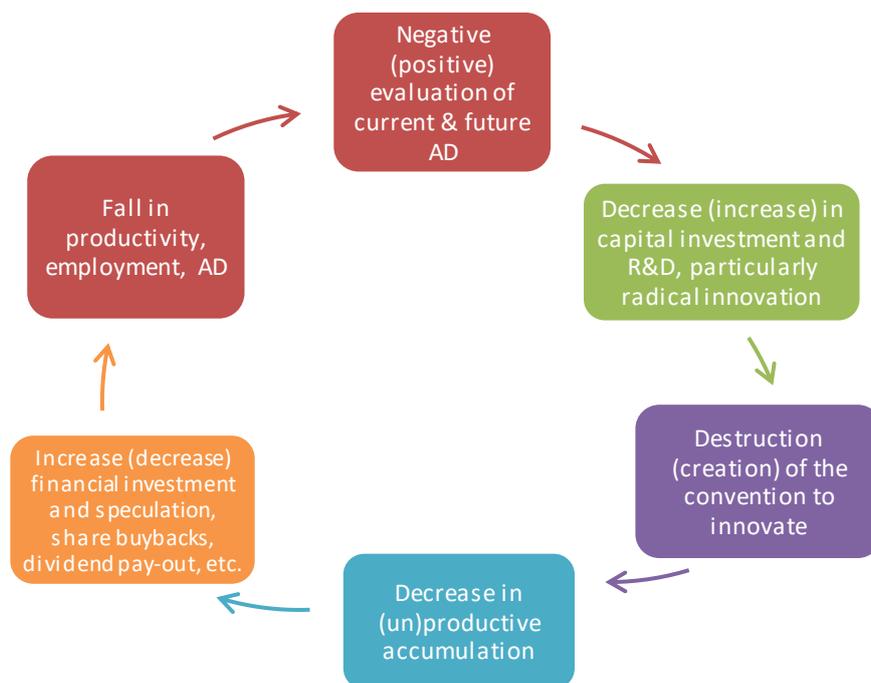
The importance of firms' investment in innovation, a much neglected area of research in post-Keynesian literature, which generally defines investment as the accumulation of capital assets (Romero, 2014, p. 200), is analysed in a unique and meaningful way by Crocco (2008), who bases his analysis on the dichotomy between 'incremental' and 'radical' innovation. Incremental innovation follows what Crocco (2008) refers to as an existing 'technological trajectory', while radical innovation results in a change to the 'technological paradigm', in which a firm's investment in R&D results in the creation of an entirely new product and presumes investment in new, rather than the use of existing, capital goods (p. 297). In undertaking his analysis of investment decisions, Crocco (2008) introduces into an otherwise standard post-Keynesian framework three different horizons of expectations formation, adding to the traditional short- and long-term expectations categories medium-term expectations, which prove critical to the understanding of a firm's decision to either innovate along an existing technological trajectory or to invest in an innovative product that changes the technological paradigm, with both types of investment having important implications for effective demand and economic growth (pp. 288, 300-301).

More specifically, short-term, or 'one production period' expectations are relevant for the decision of how much to produce of an existing product in the given period and are determined by an evaluation of effective demand for that period. The traditional investment decision, which involves the investment in (or acquisition of) a capital asset, is dependent on long-term expectations, as the cost/benefit analysis for such an investment involves assumption on multiple periods of cash flow. The novel idea of medium-term expectations applies to the introduction of a product innovation. What is critical to the decision to invest in a radical innovation is the realization of the firm's short-term expectations, implying a link between short- and long-term expectations: "The fulfilment or not of previous expectations certainly will affect the expectations about the next product innovation [...] a vital element of the formation of the expectations is the degree of mismatch between previous expectations and realized outcomes. If the mismatch is positive (negative) the next expectation will be increased (decreased)" (Crocco, 2008, p. 287).

Indeed, it is neither a novel nor a controversial assumption that increasing firm profits (in this case as a result of the innovative product the firm introduces into the market), encourage higher rates of investment, which in the future result in further innovation and technological progress. Such a virtuous cycle of innovation is related to the 'market size

effect’, a frequent subject of discussion in endogenous growth literature (see empirical support offered by Boppart and Weiss, 2013), and the ‘convention to innovate’, which interacts with the cycle of expectations, as firms accept the need to innovate to compete in the market, and their medium- to long-term expectations adjust to include the implications of a market based on a high level of investment and innovation (Romero, 2014, pp. 202-203). A corporate sector caught up in the virtuous cycle of realized positive expectations that support the convention to innovate inevitably contributes to a fast pace of accumulation of the productive capital stock (Rotta, 2015, p. 19), and hence increased productivity and higher output (Benigno & Fornaro, 2016, pp. 11-12). This formulation of investment theory adds a new dimension to the traditional post-Keynesian assumption of a dynamic, path dependent process of capital accumulation (Ford & Poret, 1990; Kopcke & Brauman, 2001). In the opposite scenario, negative expectations are self-fulfilling in that decreased investment in capital and R&D leads to the destruction of the convention to innovate, a decrease in productive accumulation at the expense of an increase in financial investment, speculation, hoarding of cash or the use of retained earnings for dividend pay-outs and share buybacks (see section 3.1.1), which ultimately lead to a fall in productivity, employment and economic growth.

Exhibit 27 Corporate pessimistic (optimistic) expectations-investment cycle.



Source: author’s elaboration.

In the context of the hitherto discussion, the importance of expectations in the formulation of a monetary and regulatory policy framework is paramount, but takes on an entirely different form to that generally ascribed to it in the neoclassical framework, where expectations are ‘managed’ to prevent deviations from the natural rate of employment owing to an inaccurate evaluation of current inflation, and where monetary policy predictability is essential in order to allow rational agents to adequately distinguish between ‘real’ and ‘monetary’ disturbances (see section 1.5). Before delving into a detailed discussion of the role of monetary and regulatory policy in shaping the determinants of endogenous economic growth, the subject of the final section in this chapter, we consider the third and final category of dynamics that characterize the US economy and which have significant implications for the elaboration of a heterodox policy framework.

5.2.3 FINANCIALIZATION DYNAMICS AND THE MINSKYIAN LEVERAGE CYCLE

While pre-crisis neoclassical literature was filled with reference to a period of great moderation, presumed to begin in the 1980s and believed to represent a definitive end to the destabilizing, extreme fluctuations of the business cycle, post-Keynesian literature considering the same period was dominated by a focus on a series of phenomena described as the process of financialization, predicting, quite contrary to the neoclassical view, a deepening of the business cycle characterized by financial crises, expected to augment in both frequency and severity and to inflict ever-greater damage to an increasingly fragile economy.

Financialization, “a term that has been used to describe quite different phenomena” (Karwowski et al., 2017, p. 2), has played out in various ways across different sectors and within different countries, and therefore in discussing the developments ascribed to this dynamics it is critical to provide a clear definition of the term. We describe three trends, captured from three different perspectives, which have direct implications for our analysis of the role of monetary and regulatory policy in endogenous growth dynamics of the economy: (1) from a sectoral perspective, we consider the drastic expansion of the financial sector that occurred over the recent decades, and the significant negative consequences that this dynamics has had on the evolution of the production economy; (2) from a firm-level perspective, we discuss the increasing involvement of non-financial corporations in the financial sector and the resulting focus on short-term profit at the expense of long-term growth; (3) from a macroeconomic perspective, we describe an economy characterized by

Minsky-style asset price fluctuations and leverage cycles, exacerbated by debt-driven demand, excess growth of the financial sector's non-traditional activities and growing financial (virtual) profit of non-financial corporations, all of which lead to stagnating growth of real GDP, increasing financial fragility and a growing risk of a systemic financial crisis.

1. Sectoral perspective: the drastic expansion of the financial sector

Financial deregulation that started in the 1970s and continued into the pre-crisis years has accompanied and, to a large extent, was responsible for a drastic, fast-pace and multi-faceted expansion of the US financial sector in recent decades (Kuttner, 2007; Karwowski et al., 2017, p. 18). Before the outbreak of the financial calamity of 2008, financial development was almost unequivocally associated with positive economic growth in economic theory, supported by the conclusions of numerous econometric studies (see a review of relevant literature in Levine, 2003). Since the 2008 crisis, however, the subject has sparked renewed interest, with a growing body of literature confirming the 'vanishing effect' of the benefits of financial development on economic growth. The non-linearity of the relationship between the two variables is at this stage well-documented, with only minimal disagreement on the turning point, or threshold level, at which more finance translates into less economic growth. The cross-country econometric work of Law and Singh (2014) indicates that the benefits to economic growth of financial expansion are exhausted at around 88 percent of private sector credit to GDP (p. 40), while Cecchetti and Kharroubi (2012) estimate a threshold level of 90 percent, adding to this finding an empirical confirmation that the growth rate of the financial sector in highly developed economies such as the United States is negatively related to the growth rate of the economy as a whole (pp. 11-12). Arcand et al. (2015) support the latter finding but stipulate a turning point of between 80 and 90 percent of private sector credit to GDP (p. 129).¹⁴⁴

A number of explanations have been proposed for the negative relationship between financial expansion and economic growth beyond the threshold level. In a follow-up study, Cecchetti and Kharroubi (2015) show that during a fast pace financial expansion, high-collateral, low productivity sectors (such as construction) benefit, as projects in these sectors are inevitably less risky and easier to finance, while R&D-intensive sectors as well as sectors in which investment depends on external finance, lag in productivity growth (p. 17). Hung

¹⁴⁴ In the United States, the private sector credit to GDP ratio was over 130 percent in 2016 (World Bank, 2017).

(2009) provides an additional explanation of this non-linearity: the author's theoretical model suggests that while financial development promotes the expansion of both investment and consumption lending, an increase in the quantity of the former promotes economic growth while an increase in the quantity of the latter has a negative impact. The crucial factor is thus the "relative magnitudes of these two distinct channels" (p. 63), a view that is in line with our prior conclusions on the negative aggregate impact of growing consumer indebtedness characterizing the process of financialization (see sections 3.1.2 and 5.2.1), and with the empirical findings of Arcand et al. (2015, p. 137). Furthermore, empirical evidence supports the hypothesis, intuitive in the context of a post-Keynesian evaluation of the fundamental economic damage inflicted by household leverage cycles, that while over the short term (defined as approximately one year), growth in consumer debt positively impacts consumption and GDP, in the long run (approximately ten years) the effect on both is negative (Lombard et al., 2017).

The extent, or depth, of financial development in econometric studies of this nature is generally gauged via ratios of bank assets (for example bank credit, private or total) to GDP (Cecchetti & Kharroubi, 2012; Law & Singh, 2014; Arcand et al., 2015), well-specified measures of bank liabilities to GDP (see discussion in Hung, 2009, p. 43; Arcand et al., 2015, pp. 108-109), or, alternatively, by considering the financial sector's value added, employment or total compensation as a share of GDP (Beck et al., 2014). In the case of the former group of measures, the implicit focus of the investigations is, inevitably, on the credit-extension role of the financial sector, which neglects the fact that traditional banking activities, such as lending and transaction services, are rapidly decreasing in relative importance, while activities such as proprietary trading, market making, advisory and insurance services take on a dominant role in the bank business model, as pointed out by Beck et al. (2014, p. 51). Such non-traditional activities, the authors argue, may lead to the movement of asset prices away from fundamentals, creating bubbles and increasing leverage in the aggregate, thus promoting financial instability and increasing the risk of a financial crisis (p. 60). Along similar lines, Lapavitsas (2014) finds that banks have been granting a decreasing amount of credit for production, concentrating their business model on alternative activities such as proprietary trading and the intermediation of financial transactions (p. 37), while the corporate sector itself has been contributing to this negative dynamics by employing bank credit for non-production activities, such as share buybacks and dividend payments (see section 3.1.1).

In the words of Tori and Onaran (2017, p. 3), "[i]nstead of being just a vehicle for more efficient production plans, in the last decades the financial activities have grown

disproportionately compared to the financing requirements of the rest of the economy”. Financial engineering has become the mainspring for wealth accumulation by a relatively minute (when considered as a percentage of the total population) group of successful financiers, who have navigated financial developments ever-deeper into uncharted waters. In the post-crisis years, with the benefit of hindsight, it is becoming evident that, as confirmed by empirical evidence, the development of highly-complex, “opaque” over-the-counter exchange markets have created conditions where highly informed dealers extract excessive rent from their clients, while simultaneously “‘cream-skimming’ the juiciest deals away from them” (Bolton et al., 2011, p. 2). Furthermore, the high rents available to such dealers have resulted in too much talented labour moving into the finance industry away from the production economy (*ibid.*, pp. 1-2; Cecchetti & Kharroubi, 2012, pp. 1-2). As a result, a “thin social layer has effectively appropriated the bulk of the modest productivity increases to a considerable extent by taking advantage of its connections with the ballooning financial system” (Lapavitsas, 2014, p. 37).

At this point, one clarification is in order, and it is instrumental to quote van Treeck (2009, p. 908), who explains that, by definition, “macroeconomic profit must always be based on real income flows and [that] [...] there is a positive, not a negative, relationship between profits [...] and physical investment (the accumulation rate) at the macroeconomic level”. It must therefore be made clear that the financial sector has not become a ‘source’ of profit at the expense of profit-making activity in the non-financial sector, as frequently assumed,¹⁴⁵ “but rather that it has become increasingly successful at *extracting* profits from the real economy” (p. 911). And although “firms in the aggregate can by no means autonomously choose [...] between [...] non-financial and financial profit” (p. 911), the extent to which the financial sector drains profits from the production economy is evidenced by the data (Krippner, 2005, pp. 178-181). The transformation of real profit into financial profit occurs predominantly through the debt interest payment channel (as, potentially, one corporation’s debt interest expense appears as a profit in the financial portfolio of another corporation), with debt interest income becoming an increasingly important source in the portfolio profit share of non-financial corporations (*ibid.*, p. 187).

¹⁴⁵ See, for example, Krippner (2005) and Lapavitsas (2014, p. 36).

2. Firm-level perspective: financialization of the non-financial corporate sector

By broaching the latter subject we have inevitably introduced an important element of the second dynamics central to the financialization thesis as formulated in this chapter, namely, the increasing financialization of the non-financial corporate sector. The financialization of the US corporation has manifested itself in a crescent focus on short-term profit at the expense of long-term growth, resulting in waning investment in physical capital and innovation, falling productivity, increasing income inequality, and a prolific participation of the corporate sector in the leverage cycle. All these are central explanatory factors of stagnating growth in the production economy and the increasing fragility of the non-financial corporate sector.

Although the substitution of short-term financial profit for long-term investment in production is not a viable corporate growth strategy in the aggregate, as argued previously, it has been empirically confirmed that corporations' increasing involvement in the financial markets has been accompanied by decreasing investment in physical capital and innovation (Orhangazi, 2008; Skott & Ryou, 2008, pp. 831-832; Demir, 2009; Onaran, 2016; Tori & Onaran, 2017).

Tori and Onaran (2017, p. 35) succinctly present the major trends in corporate behaviour in the decades of financialization, which "depicted as the increasing orientation towards external financing, shareholder value orientation and the internal substitution of fixed investment by financial activity, had a fundamental role in suppressing investment". The trend of increasing orientation towards external financing, or more precisely, the growing dependence on bank credit at the expense of internally-generated funds and equity, has been promoted by favourable treatment of debt financing within the US tax code, which permits the deduction of interest payments from gross revenue, as well as corporate management's desire and possibility to drastically increase the return to equity via high leverage (Palley, 2007, p. 19). In the post-crisis period, persistently low interest rates have acted merely to support the trend of increasing corporate leverage in the absence of an effective mechanical link between low policy rates of interest and corporate investment in fixed capital and innovation (see Exhibits 4, 8 and section 3.1.1).

The use of often excessive leverage to increase returns to equity is, in turn, emblematic of a significant mutation in the culture of corporate governance that has occurred over the recent decades, a subject that is the focus of a rich body of literature. There is a general consensus that the culture of corporate management has evolved towards a 'downsize

and distribute' policy, which has at its core intensifying shareholder value orientation and increasing redistribution of corporate profit via high dividend pay-outs and share buybacks (a trend that has intensified since the 2008 crisis), as well as increasingly disproportionate and growing top executive compensation. Ultimately, what is (erroneously) perceived by management to be a valid strategy for growth, namely the accumulation of 'quick' profit from short-term financial investment, appears more in line with this new corporate environment than risky, long-term investment in physical capital and innovation (for an elaboration on the subject see Minsky, 1986a; Lazonick & O'Sullivan, 2000; Rajan, 2005; Cordonnier, 2006; Lavoie, 2007, p. 9; Palley, 2007, p. 18; De Ridder, 2009; van Treeck, 2009, p. 923; Lazonick, 2010, p. 700; Davis, 2016).

In fact, the decline in recent decades of productive capital accumulation and investment in innovation is, to a large extent, attributable to the changes in the corporate governance paradigm briefly described above. Dampening the gravity of the situation and the urgency of the need to modify US corporate investment strategy with a view to preserving the long-term profitability and viability of the corporate sector is the fact that, despite record low investment in capital and innovation, corporate profits have been positive and growing. This is explained, in part, by the growing use of debt to support consumption (Cynamon & Fazzari, 2008, pp. 18-20), the decreasing (considering the pre-crisis years) household savings rate and the increasing distribution of corporate profit to shareholders, both of which in the short to medium term have acted to support aggregate demand and, in turn, corporate revenue (van Treeck, 2009, p. 925), as well as the significant capital inflows from abroad that have, temporarily, sustained equity prices and economic growth in the United States in spite of the negative domestic dynamics (*ibid.*, p. 928). In the aftermath of the 2008 financial crisis, low interest rate policy has added an additional stimulus by supporting equity prices and by suppressing the interest expense of the highly leveraged corporate sector, further boosting corporate revenues and supporting a gradual return to debt-driven consumption amongst households. Clearly this is only part of the story, as the corporate sector has also responded by decreasing innovation and investment owing to the weakening of aggregate demand resulting from negative structural as well as post-crisis dynamics discussed earlier (see Exhibits 6-11 and 15).

The medium- to long-term consequences of the financialization-related metamorphosis of the US corporate sector are substantial and far-reaching. To begin with, the culture of disproportionate and growing top executive compensation is exacerbating income inequality and negatively impacting the employment conditions in the United States, as the

beneficiaries of rising stock prices and distributive corporate policy are generally wealthy households and individuals such as corporate managers and stock owners (van Treeck, 2009, p. 918; Lazonick, 2010, p. 700), thereby aggravating the negative long-term effects on economic growth of this structural dynamics, as discussed previously.

Within our analytical paradigm, which embraces a conceptualization of GDP growth as endogenous and path-determined, the repercussion of greatest significance is the domino effect of eventually (and inevitably) decreasing corporate earnings and economic growth in the long run. As productive capital accumulation and innovation dynamics weaken, while high dividend pay-outs and share buybacks create an increasing reliance on debt, rather than internally generated cash flow, investment is further depressed, prospects for long-term profit generation wanes (Hein, 2015, p. 27), as do the economy's productivity growth rates, and the financial fragility of the corporate sector increases (Minsky, 1986, pp. 351-352; Minsky, 1992, pp. 6-7). In the long term, this trend sets the economy on a lower trajectory of growth and a permanently lower level of employment, as explained by Keynes and Kalecki (see section 1.4) and described by Keynes's theory on multiple employment equilibria (see sections 1.3 and 1.4) – a pessimistic prognosis that is likely to be further exacerbated by inevitable future economic shocks of financial origin.

To understand precisely why future systemic financial crises appear unavoidable, we turn now to an examination of financialization dynamics from a macroeconomic perspective, basing our analysis on the nature of asset price and leverage cycles in recent decades, and drawing heavily from Minsky's financial instability hypothesis (FIH) (Minsky, 1982, 1986a, 1992, 1993) and Rossi's and Cencini's elaboration of a framework for understanding the pathological nature of endogenous money creation in the modern banking sector (Cencini, 2001, 2012; Cencini & Rossi, 2015; Rossi, 2007, 2009b, 2011a, 2011b, 2015).

3. Macroeconomic perspective: asset price and leverage cycles

Our hitherto discussion has focused on explaining the lethargic growth of the US economy since the crisis of 2008 by considering structural, post-crisis and financialization dynamics, which combine to explain the unexpectedly drawn-out and disappointing recovery of the US economy up to the time of writing. While it is beyond the scope of this dissertation to discuss the precise triggers of the financial calamity, an informed view on the nature and causes of the leverage cycle, which has characterized and been fuelled by financialization, is imperative. It will provide an important pillar of our theoretical framework for the delineation

of an alternative, effective approach to the implementation of monetary policy, and an inevitable consideration of macroprudential regulation, necessary to support and supplement the limited but crucial role of the central bank in promoting sustainable economic growth dynamics (see section 5.3).

The economy described by Minsky is characterized by leverage cycles caused by dynamics predominantly originating in the interaction between the corporate and the financial sectors, cycles that generate mounting financial instability and culminate in an inevitable systemic financial crisis. What is imperative to note is that these dynamics, described by Minsky in the 1970s and 1980s at the time of his elaboration of the FIH (Minsky, 1982), have been greatly exaggerated by the trends we have delineated above and which we have referred to as structural and financialization dynamics. As we have argued, these trends have altered the structure and functioning of the economy most drastically since the 1980s, validating and lending even greater force to Minsky's theory, so precise in the delineation of the underlying dynamics as to appear something of a clairvoyance.

Minsky's FIH has received monumental attention and support, particularly since the financial collapse of 2008, in both theoretical and empirical literature.¹⁴⁶ For example, Keen's theoretical formalization of the FIH, proposed over 20 years earlier (Keen, 1995), proved to be consistent with the behaviour of the US economy over the course of the subsequent 15 years (Keen, 2013, pp. 221-222), much as the theoretical model of Fazzari et al. (2008), which produces results consistent with recent empirical trends (p. 558). Stockhammer and Wildauer (2016) find support for the existence of Minskyian debt- and household wealth-led consumption cycles across a sample of 18 OECD countries (p. 1624). The empirical work of Karwowski et al. (2017), using data from 17 OECD countries in the ten years prior to the 2008 financial crisis, illustrates the link between financialization and "Minsky-type processes", including an increase in leverage cycles and asset price inflation, which lead to financial fragility and eventual collapse (pp. 18-19).

In illustrating the nature of the debt-driven economy, Minsky describes a cycle that begins in a phase of normal economic activity and conservative finance, where the risk margin on borrowed funds is high and most investments are successful. This period of relative calm and prosperity encourages a growing risk appetite, which in Minsky's theory initially results in a growth in investment, as more and cheaper credit is granted, accompanied by a simultaneous rise in asset prices, which in turn supports the value of collateral backing

¹⁴⁶ For a simple, clear-cut formalization of the FIH see Charles (2008).

the growing volume of loans (Keen, 2013, p. 223). Financialization, as defined in our framework, has further complicated this phase of the Minsky cycle, as corporate investment in physical assets and innovation has been replaced by the increasing flow of corporate earnings into the financial circuit, resulting in a mounting weakness in the production economy from the very start of the Minsky cycle, while the augmenting corporate debt stock is compounded by the increasingly debt-financed household consumption trend, which creates an additional fragility in aggregate demand dynamics.

In Minsky's theory, the period of prosperity thus leads to growing complacency in the credit markets, exhibited by narrowing risk margins, and in the corporate sector with firms undertaking increasingly risky investments. In the words of Minsky himself, "the apt liability structure for carrying a set of assets is not technically determined and is capable of rapid change. This is so because the debt-carrying capacity of any unit depends not just on expected cash flows, but also on the margins of safety that borrowers and lenders find necessary" (Minsky, 1986, p. 349). Financial fragility begins to mount as investment dynamics deteriorate, and aggregate corporate cash flow wanes while aggregate indebtedness of the sector grows. An increasing number of liabilities mutate from hedge to speculative and eventually to Ponzi units, which obliges the sector to continue augmenting leverage to maintain interest payments of debt. As the degree of validation of liabilities is a function of real investment activities, the combination of mounting leverage and weakening investment leads to increasing financial fragility of the corporate sector (Minsky, 1992, pp. 6-8).

Minsky believed that towards the end of the cycle upswing, interest rates would creep up even without the intervention of the central bank, as the price of low-yielding, highly liquid financial products falls as risk appetite increases, "leading to a rise in the interest rates offered by them as their purveyors fight to retain market share" (Keen, 2013, p. 223), and also as a result of the general decrease in market liquidity. Market interest rates spike suddenly as the economy enters the pre-crisis phase, where Ponzi units dominate, a forced sell-off of assets to cover margin calls begins and, more generally, the critical condition prevailing in the economy and the financial system becomes increasingly evident to the masses, leading to panic. While in Minsky's framework the determining factor that tips the economy into a downward trend is a rising interest rate, the experience of 2008 suggests that a number of other triggers, both tangible and intangible, which create tension in the financial markets thus increasing the margin of safety demanded by lenders, can cause the net worth of Ponzi units to collapse, leading to rapid deflation in the asset markets and culminating in a systemic financial crisis.

Furthermore, while Minsky's analysis focused generally on the interaction between the corporate and financial sectors, during the financialization decades dynamics in the household sector, considered previously, have contributed to magnifying the leverage cycle. As the bargaining power of labour weakened, leading to greater inequality and a falling wage share (Onaran, 2016, p. 5), debt-financed consumption became the norm (Hein, 2015, p. 27), and simultaneously financial innovation permitted greater access to credit for low-income households that were previously entirely cut off from the credit markets (*ibid.*, p. 28), further encouraging the build-up of debt during the upswing phase of the leverage cycle.

Here, the post-Keynesian view of the economy as a complex and dynamic system characterized by decision making under radical uncertainty and frequently irrational and non-rational expectations provides an elucidating background to interpreting the seemingly illogical behaviour of the household sector (see section 2.6.2), which exhibits the propensity to spend beyond its means thus contributing in the aggregate to increasing financial fragility, quite contrary to the neoclassical depiction of a representative agent as an intertemporal optimizer making spending decisions based on informed calculation, and using debt to smooth lifetime consumption relative to income. In fact, the gradual loosening of the financial constraint for the low- and middle-class consumer greatly encouraged sub-optimal spending decisions, fuelled by general optimism (animal spirits) and "encouraged by the fact that others were also borrowing in new ways, and it seemed to work out for them" (Cynamon & Fazzari, 2008, pp. 3, 14-15; see related discussion in section 2.5.3 on the physiological, psychological and sociological influences on individual behaviour and decision making). Applying Minsky's theory to the household sector, Cynamon and Fazzari (*ibid.*, p. 3) argue that consumer debt had been supported and temporarily "validated" by low interest rates and rising real estate asset prices up to 2008 (the time of the article's publication). Extending this argument with the benefit of hindsight, and recalling Koo's theory of a balance sheet recession, which was applicable from the start of the financial crisis to approximately 2014 when minimal re-leveraging began, we have a general illustration of the workings of the Minskyian debt cycle in relation to the household sector.

But while Minsky's FIH framework is highly descriptive of the sectoral dynamics that underlie the leverage cycle and has proved to be powerfully predictive of the macroeconomic dynamics that characterize the modern capitalist system, it is incomplete without a fundamental understanding of the "monetary-structural flaw" in modern banking sector accounting, elaborated most notably by Rossi and Cencini (Cencini, 2001, 2012; Cencini & Rossi, 2015; Rossi, 2007, 2009b, 2011a, 2015) on the basis of the original writing of Schmitt

(1984). Schmitt's monumental theoretical work culminated in the elaboration of a comprehensive and revolutionary paradigm, which he named 'quantum macroeconomics', for the analysis of unemployment, inflation, and the (pathological nature of the current) process of capital accumulation, as the title of his 1984 book suggests, but also, in further application, to financial instability and financial crises. It is, most crucially in the context at hand, the latter two phenomena on which the extensive work of Cencini and Rossi have offered an exhaustive elaboration.¹⁴⁷ By presenting a clear-cut distinction in the definitions of money, credit and income, the authors demonstrate the nature of the structural flaw in the existing payments system that permits the divergence of money and income generation in a monetary production economy, and which leads to destabilizing and damaging leverage cycles that have become, under the current arrangement, an inevitable and unavoidable characteristic of the US economy. This heterodox exposition also makes a fundamental contribution to the stagnation debate, provides an alternative explanation for the persistence of subdued consumer price inflation that characterized the Great Moderation era (see section 1.13), and, most important, offers a realistic and practical solution for the elimination of leverage cycles and asset price bubbles, a subject relegated to the final section of this chapter.

In presenting the authors' critique of the structure of the modern bank payments system, we recall our previous discussion on the absence of an effective limit to the endogenous creation of money, which occurs via a simultaneous booking of an asset (loan) and a liability (deposit) on a bank's balance sheet (see sections 1.9 and 1.10) and the profitability-driven process of decision making regarding the extension of a marginal corporate or consumer loan (see sections 1.11 and 4.1.3). Although money endogeneity is not a modern phenomenon (see Rochon & Rossi, 2013), US Congress' abolition of the separation between the activities of commercial and investment banks in 1999 created an important flaw in the payments system, which has contributed to the destabilizing process of debt accumulation in excess of production activities in the economy (Rossi, 2009b, p. 4; Cencini, 2012, pp. 210-213), resulting in leverage cycles that will lead inevitably and repeatedly to financial crises (Rossi, 2011a, p. 62), which, in turn, will cause fundamental and long-lasting damage to the economy's growth prospects.¹⁴⁸

¹⁴⁷ Our treatment of the subject here cannot do justice to the profound and far-reaching analysis offered by Schmitt, Cencini and Rossi, and must therefore be considered an important shortcoming of this work. We limit ourselves to presenting, in broad strokes, the fundamental theoretical and regulatory implications of the authors' approach to macroeconomic analysis.

¹⁴⁸ For a historical overview of the process of deregulation that occurred in the United States since the 1970s see Sherman (2009). For the argument that the US Federal Reserve has failed to capitalize on powers granted to it by Congress to limit excessive and dangerous lending activity via regulation see Kuttner (2007, pp. 2-7).

Under the arrangement where no accounting distinction exists between a bank's investment and commercial activities, Rossi (2015) explains, a new loan "can be drawn upon either in order for firms to dispose of 'initial finance' productively (spending the relevant amount in an income-producing transaction) or in order for any borrowers to obtain various goods, services or assets through separate income-consuming expenditures" (p. 216). The former eventually results in the creation of new products and hence income, with the original debt thus validated and new deposits created within the overall banking sector. In the case of consumption-related lending, no new income is produced and the repayment of the original loan requires the extension of a new loan (*ibid.*, p. 216), a self-reinforcing process that is sustainable only as long as banks continue to grant additional credit for non-production expenditure. This process is thus related to Minsky's representation of the economy's movement over time through speculative to Ponzi units of finance, but seen from the additional perspective of banking sector accounting, an aggregate view of the distinct processes of income generation (associated with banks' creation of money) and credit expansion (associated with banks' extension of credit), which reinforces the fundamental link between the production economy and the financial sector (represented in Minsky's theory via a recurring emphasis on the association between investment/corporate cash flow and growth of debt balances/interest payments).

In the endogenous money framework, the above exposition leads to important conclusions regarding the implications of banks' double-entry bookkeeping and the effective absence of a limit to the quantity of bank money that can be endogenously generated by the banking sector, for inflation. Specifically, in the absence of a distinction between money and income on banks' balance sheets, in other words "if money takes the place of income, a pathology arises, and an inflationary gap is formed between demand and supply" (Cencini, 2012, p. 207). In fact, as explained by Rossi (2009b, pp. 4-5), the spending of deposits created in excess of produced income in the economy generates inflation in either the product or the asset markets, depending on which markets the deposits are spent in. When spent on produced goods, consumer price inflation ensues and a central bank following an implicit or an explicit inflation-targeting regime would be expected to react, raising the policy rate of interest in an attempt to stifle inflation. Over the course of the financialization decades, as we have seen, an increasing quantity of endogenously-created bank deposits (of both the household and the corporate sector), have been flowing into the financial, not the production, circuit, leading to an increase in the price of assets instead, as predicted by Rossi's analysis. In such a case, consumer price inflation rates remain subdued (a phenomenon for which the

central bank receives praise on the success of its implementation of inflation-targeting policy, as during the years of the Great Moderation), the policy rate of interest remains low (or at near-zero rates as in the post-crisis years), and in the meantime asset prices bubble, corporate and household leverage mounts, and the Minsky cycle approaches its peak, the stage at which a financial collapse is imminent.

5.3 THE PARADOX OF MONETARY POLICY (IN)EFFECTIVENESS

Here, precisely, we come to discuss the paradox of monetary policy (in)effectiveness, which our research thus far has indicated from a variety of perspectives. We have illustrated in our hitherto analysis that the expansion of the financial sector at the expense of the production economy and the amplification of the Minskyian leverage cycle are the anti-theses of strong and sustainable economic growth, which is stalled by growing income inequality, a rising profit share, decreasing investment in capital and innovation, and pessimistic expectations as well as balance sheet recessions that are the damaging results of severe financial crises.

While monetary policy is, in our framework and according to our analysis, clearly ineffective in influencing the growth rate of the production economy via the traditionally-presumed channels of influence (see Chapters 3 and 4), the role of the central bank during the various stages of the Minskyian cycle is anything but inconsequential. For one, the failure of the monetary authorities to recognize the existence of the leverage cycle is in and of itself a crucial problem, as Minsky himself had warned. During a cycle upswing, positive expectations are extrapolated into the future and are “reinforced by authoritative views that the prior downside movements of overall profits was largely the result of errors of commission and omission by the authorities, that there are no endogenous forces making for such a collapse of profits and that the authorities now know better so that the error will not now occur” (Minsky, 1986a, p. 350). A central bank sustaining such a perspective thus reinforces and strengthens the dynamics that lead to a further accumulation of debt by curtailing lenders’ and borrowers’ risk (*ibid.*, p. 351), resulting in rising asset prices, fervent financial speculation and mounting financial fragilities, which ultimately culminate in financial collapse.

Furthermore, a prolonged period of low interest rates interferes with what Minsky (1982, p. 10) referred to as the “critical relation that determines system performance”, namely, the relation “between cash payment commitments on business debts and current business cash receipts due to present operations and contract fulfilment” (*ibid.*). Placing this

argument in the context of the current protracted post-crisis recovery, corporate cash flows purposefully (and artificially) inflated by low policy rates of interest and loose credit conditions supported by a prolonged period of quasi-debt management and credit policies create a hitch in the existing mechanism of money creation by the banking sector, fundamental precisely because “the relation between cash receipts and payment commitments determines the course of investment and thus of employment, output and profits” (*ibid.*, p. 10).

A prolonged period of low interest rate policy can thus be the cause of a subsequent upswing in the leverage cycle, as corporations increase leverage, taking advantage of the low cost of debt, while simultaneously growing complacent towards the need to invest and innovate with a view to insuring sufficient profitability of the underlying business’ production activities. As highlighted earlier, the corporate sector’s growing reliance on income from financial investment, predominantly from investment in fixed income securities (corporate debt), is a Gordian knot, since in the aggregate interest payments and receipts sum to zero minus the fees that accrue to the banking sector for origination and distribution activities, and such financial activity comes necessarily at the expense of investment in activities of a productive nature.

When interest rates remain at an excessively low level for a prolonged period of time, negative dynamics, which result in a new upswing of the leverage cycle, are created. What is more, low interest rates are also a determining factor in the eventual reversal of the cycle, as inevitably increasing rates of interest eventually place unsustainable pressure on accumulated Ponzi financial units. The market’s need to “validate debts” causes a drastic sell-off of assets, which results in a cascade of asset prices and which exposes and further aggravates over-indebtedness, leading to defaults and the start of a recession (Minsky, 1993, p. 16).

Central bank policy that aims to sustain economic growth by encouraging increased corporate borrowing (interest rate channels – see section 3.1.1), an accumulation of household debt for consumption (interest rate channels – see section 3.1.2), rising leverage of the household and corporate sector on the back of monetary policy-fuelled, temporary asset price inflation (balance sheet channels – see section 3.2), and increasingly aggressive lending practices by the banking sector (bank lending channels – see section 4.3) is not only ineffective, but is entirely counterproductive in that it encourages the development of precisely those trends which are leading to the increasing magnitude of leverage cycles and augmenting frequency of financial crises, both of which are inflicting lasting damage on the fundamental determinants of long-term economic growth in the United States.

To the extent that the substantiation of our essential hypothesis of the ineffectiveness of the current approach to monetary policy implementation is at this stage complete, we turn to briefly consider the contraposition of this thesis, by sketching the outlines of an alternative role within which monetary policy could effectively contribute to a functioning of the monetary production economy conducive to steady and sustainable rate of economic growth that benefits an increasing, rather than a diminishing, proportion of the population. This subject, which we can treat only superficially, provides a fertile and promising area for subsequent research. In offering a roadmap for future investigations into the design of an alternative, effective framework for monetary policy implementation, an area in which post-Keynesian literature remains relatively unsubstantial, we consider the channels through which a central bank focusing on long-term economic growth rates as its primary target can effectively and positively influence the economy.

5.4 EXPECTATIONS, INTEREST RATE POLICY AND REGULATION: A ROADMAP

In this concluding section, we consider the role of the central bank in managing expectations and implementing interest rate policy, argue for a decommissioning of large-scale quasi-debt management and credit policy for the purpose of managing interest rates and asset prices, and evaluate the indispensable role of regulatory policy in the achievement of an economic growth objective as outlined in section 2.2.2.

Drawing on our initial discussion of the role of expectations in economic decision making and the importance of expectations management for the success of monetary policy (see section 2.6.3), we recall the crucial distinction between three precise categories of expectations, namely, expectations regarding the effectiveness of monetary policy, expectations regarding the stance of monetary policy over a specific timeframe and, finally, expectations of future economic developments (that is, the expected changes in key economic variables). With regards to the first expectations channel, it is imperative that the central bank adopt a revised delineation of monetary policy transmission, accurate in its representation of what monetary policy can and, most important, cannot do (see Chapters 3 and 4). This is the first step to restoring waning central bank credibility (see section 4.6), thus paving a solid path of transmission via expectations management, and to supporting the development of a new paradigm of monetary policy making (see section 2.6). The central bank must, therefore, embrace the limits of its powers in order to re-establish and reaffirm its validity and centrality in economic policy making. The key to the achievement of this goal, as argued previously, is

the replacement of inflation targeting with the objective of promoting maximum sustainable rates of GDP growth, and, as will be argued subsequently, the establishment of a longer-term horizon for the delineation of a monetary policy stance abandoning thus the futile attempt to micromanage the economy, and the demonstration of a consistent commitment to ensuring financial stability.

In managing the second category of expectations, which concern the stance of monetary policy, it is likewise imperative that the central bank adopt a longer-term timeframe in setting out its plan for policy implementation and reemphasize the (largely discarded) objective of maintaining “moderate long-term interest rates” and financial stability. A consistent, longer-term objective, unhampered by the potentially contradictory pressures on interest rate policy that aims to simultaneously target inflation and financial stability (Panzera, 2015, p. 160) will promote an environment of consistency and macroeconomic stability most conducive to long-term expectations formation and the vital realization of short-term expectations (discussed in the context of the ‘corporate expectations-investment cycle’), which would encourage businesses to undertake long-term investment projects. A probable secondary effect of the successful implementation and achievement of the above two objectives with regards to expectations management and the resulting increase in long-term productive investment is the extrapolation of positive expectations for strong economic growth into future time periods, with time validating previous expectations and thus longer-term investment commitments, strengthening aggregate demand and further promoting and entrenching positive dynamics for sustainable growth in the long term (Exhibits 26 and 27).

To concretize the foundations of the above conclusions on the most effective approach to central bank expectations management we consider, in the context at hand, the importance of ‘moderate’ long-term interest rates, the rationale for the adoption of a longer-term timeframe for the implementation of monetary policy objectives, and finally the paramount significance of financial stability in endogenous, path-dependent growth dynamics. With this target in mind, we subdivide the remainder of this chapter in three sections, briefly considering in turn each of the following policies of the central bank: (1) interest rate policy, (2) credit and quasi-debt management policy, and (3) macroprudential regulation.

1. Interest rate policy

In formulating a preliminary recommendation for interest rate policy implementation, two broad issues require critical consideration. The first consists in the elaboration of a perspective on the nature of the decision-making process involved in executing changes to

the level of interest rates, frequently presented in the form of a central bank reaction function, which offers a precise and formal guide for the implementation of interest rate policy, while the second involves the elaboration of a view regarding the *level* of the policy rate of interest that, in the long term, is perceived as most conducive to the achievement of stipulated objectives.

The view that central bank policy based on close adhesion to a reaction function is suboptimal is not new to post-Keynesian theory (Gnos & Rochon, 2007, p. 381), and is based on the concern that even a reaction function developed within a post-Keynesian theoretical framework would risk endogenizing the interest rate, in practice an exogenous variable (see section 2.5.3), and, more generally, that a central bank which takes into account multiple objectives (say, GDP growth, employment and financial stability) and which accepts the complex and mutually-recursive nature of growth determinants cannot depend on a simplified function to attempt to (misguidedly) micromanage the economy (see section 2.6.1).

The intricacy of the effects that a change in the policy rate of interest may have on various endogenously-determined economic variables such as productive capital accumulation and profit (hence ultimately economic growth) is explored by Hein (2007), who illustrates how “the short-run and long-run effects of interest rate policies in our model may depend on the rentiers’ propensity to save, the elasticity of investment with respect to debt and the interest rate, the responsiveness of investment to capacity utilization and to unit labour costs, the interest rate elasticity of the mark-up, and initial values of the interest rate and the equilibrium debt-capital ratio” (pp. 324-325). Underscoring the path-dependent nature of the relationship between the rate of interest and the debt/capital ratio, in line with the conclusions derived by Minsky in the context of the financial instability hypothesis, the author illustrates that the variable’s evolution depends on “initial conditions, i.e. on the debt-capital ratio in the initial equilibrium [...] and on the level from which interest rates start to change” (p. 324).

The efforts of a central bank attempting to micro-manage the economy under such conditions and on the basis of a reaction function that inevitably involves significant simplification and a complex, imprecise process of estimation of the values of variable coefficients (see section 2.5.4) is not only likely to be futile but risks being dangerously destabilizing. In this context and within the theoretical framework developed in the previous sections, which places the process of long-term expectations formation (and subsequent realization) centre stage in the evolution of endogenous growth dynamics, the most appropriate approach to interest rate policy implementation would be founded on the

principle of stability and predictability of the policy rate of interest over a medium- to long-term horizon.

We return to the evaluation of a specific post-Keynesian policy proposal shortly, but before doing so, we recall that the central bank determines only the short-term risk-free rate, while short- and long-term market rates of interest are largely beyond its control. To this extent, successful achievement of long-term stability of the interest rate will be possible only if the central bank is successful in harnessing expectations in such a way as to create a general climate of stability, as discussed above, which in turn will help to reduce the risk premium and will thus be reflected in short- and long-term market spot rates and hence a flatter yield curve than what might be expected in a climate of instability (see section 3.1.1). As will be suggested in the context of the discussion on regulation, a significant reduction in the domestic leverage cycle is a critical element in the implementation of interest rate policy, the successful achievement of long-term interest rate stability and the eventual concurrence of market forward rates with realized spot rates along the yield curve (see section 2.5.2).

As implied by the stated, though generally overlooked, (intermediate) objective of the existing monetary policy framework (see section 2.2.1), moderate long-term interest rates are also a crucial pre-condition for the achievement of ultimate economic objectives, and particularly so in the alternative framework developed in this dissertation. Excessively low policy rates of interest over a protracted period of time may be perceived as a sign of economic malaise (see section 3.1.2), create significant negative dynamics in the financial markets (see section 4.3.2), and are generally unfavourable for the formation of expectations determining corporate investment. Low interest rates inevitably imply *rising* interest rates in the future, a dynamics that is problematic for decision making in the corporate sector, as interest payment increases must be factored into the already complex, subjective calculation of project funding and profitability (see section 3.1.1).

It is fundamental to underscore the critical difference in the effects on the economy of a *persistently* moderate (as opposed to low) level of the policy rate of interest and the effects of a *change* in the interest rate from any existing level (including near-zero rates that were maintained in the years after the 2008 financial crisis). While a *rise* in the interest rate, even from excessively low levels, frequently provokes a negative market reaction (Bauer & Rudebusch, 2013; Harding & Politi, 2013) and creates negative income dynamics for the heavily-leveraged portions of the corporate and household sectors (in fact, a rise in the interest rate determines the turning point of the leverage cycle in Minsky's FIH, as described previously), outside a framework bounded by its reliance on the existence and determining

force of a ‘natural’ rate of interest, there is no valid reason to expect the generation of negative dynamics resulting from a stable, moderate policy rate of interest.

Drawing on the previous discussion of the mechanisms of monetary policy implementation in section 2.3, we recall that, according to the decoupling principle, in the current monetary arrangement of the US banking system, different levels of the interest rate can be compatible with a given quantity of base money made available by the central bank. The central bank is, therefore, unconstrained in its decision on the level of the policy rate of interest by the liquidity needs of the banking sector (see section 2.3). In fact, outside the theoretical constructs of the mainstream inflation-targeting framework, there is no conjectural impediment whatsoever to the implementation of a policy rate of interest at any level the central bank should deem most appropriate in the long term, while the market rate of interest is subsequently adjusted via a mark-up that depends on banking sector dynamics, liquidity preference and, more generally, expectations (see sections 2.5.3 and 4.1.2; Keynes, 1937, p. 665).

The argument for a move away from low interest rate policy towards moderate, stable rates is not new in the post-Keynesian theoretical sphere,¹⁴⁹ though it is perhaps a somewhat marginalized proposition. A more central theme of post-Keynesian policy discussions, at least until the start of financial turmoil in 2008, is centred on Keynes’s (1947, pp. 375-376) original idea of the “euthanasia of the rentier”, with proponents generally advocating low, if not negative, real rates of interest motivated by a number of socio-political objectives (Gnos & Rochon, 2007, pp. 382-383). For example, as expounded by Smithin (2004, p. 66), “[a] cheap money rule will tend to promote higher growth, higher employment and higher real wages [...] and there seems to be no reason in logic why these should not be pursued to the maximum extent consistent with preserving the basic fabric of the existing financial settlement”. The analysis undertaken in Chapters 3 and 4, however, suggests that, on the contrary, there are valid reasons to reconsider the benefits of low interest rate policy.

Within the parameters of the theoretical framework developed in this dissertation and on the basis of the empirical evidence hitherto presented, a more congruous approach to the implementation of interest rate policy, drawn from existing post-Keynesian interest rate rule proposals, is embodied in the Pasinetti rule, which envisages the setting of policy rates of interest at a ‘fair’ rate that neutralizes its use as an instrument of income distribution. More

¹⁴⁹ Kregel (2014a) expresses support for a move away from low interest rates on the basis that “higher rates may be a positive element in supporting recovery, and the return to normal policy should provide a strong signal to improve investor sentiment” (p. 3).

specifically, the real rate of interest should be set equal to the rate of growth of labour productivity, thus preserving purchasing power of funds for both borrowers and lenders (Pasinetti, 1981, p. 174). The gradual rise in the policy rate of interest that accompanies increasing economic growth according to the Pasinetti rule is not, however, intended as a countercyclical measure aimed at restraining ‘excess’ growth or inflation. While inexplicable in the mainstream theoretical framework, a possible positive correlation between the interest rate and economic growth is well known and formally documented in post-Keynesian work.

As illustrated by Hein (2007, p. 330) in the context of a Minsky-Steindl growth model, “long-run stability is associated with a parameter constellation which yields a short-run positive (‘puzzling’) relation between the interest rate and the equilibrium rates of capacity utilization, capital accumulation and profit: a low rentiers’ saving propensity and a low sensitivity of investment with respect to debt or interest payments [see section 3.1.1] and a high elasticity with respect to demand or capacity utilization [see sections 1.3 and 1.4]. We have associated this parameter constellation with equal distribution of financial wealth [see section 5.2.1], long-term stable relations between the financial sector and non-financial business given bank-based financial systems [see section 5.2.3], and with periods of capital accumulation with stable sales and profit expectations [see section 5.2.2]”. As evidenced by the relevant sections (inserted in brackets), Hein’s (2007) findings are starkly in line with the arguments presented in this dissertation, which have contributed to strengthening the post-Keynesian case for a drastic revision of the monetary policy paradigm by undertaking a thorough and methodical analysis of monetary policy transmission mechanisms, a subject that has received insufficient attention within an otherwise solid and comprehensive heterodox theoretical framework.

2. Quasi-debt management and credit policies

The hitherto conclusions on the transmission of interest rate changes to the banking, corporate and household sectors, which we will review shortly, and the above-mentioned recommendations for the implementation of interest rate policy in a growth-oriented monetary policy framework, also hold significant implications for the use of quasi-debt management and credit policies by the central bank. While the discussion of the central bank’s fundamental role as lender of last resort during the critical stages of a financial crisis has remained largely outside the scope of our analysis, the continued use of LSAPs in private

markets nearly a decade after the beginning of financial turmoil in 2008 has rendered this policy an implicitly permanent element of the central bank's policy kit.

As the macroeconomic effects of quasi-debt management and credit policies have previously been considered in detail, we limit the present discussion to recalling that the negative 'side-effects' of these policies are significant (for specifics, see sections 4.1.3 and 4.4.3), with the purpose of bringing together the findings and concluding effectively on the role (or, more precisely, the absence thereof) of large-scale private asset and public securities purchases in the management of endogenous growth dynamics. As a matter of fact, the continued use of quasi-debt management and credit policy by the central bank over such a prolonged period of time must be attributed to a large extent to the concern over the negative market reaction at the reversal of this policy (Bauer & Rudebusch, 2013; Harding & Politi, 2013), given the absence of theoretically justifiable benefit of its continued use in the medium to long term (see sections 3.1.1 and 3.1.2). Acknowledgement of the challenge involved in 'normalizing' monetary policy beyond the immediate post-crisis period lends even greater validity to the view that prolonged use of large-scale quasi-debt management and credit policy beyond the period of significant market turmoil should be decommissioned, in view of its ineffectiveness, the challenge involved in its eventual reversal, and the numerous destabilizing dynamics that this policy creates in all sectors of the economy.

In the context of the approach to interest rate policy implementation advocated in this dissertation, it is instrumental to underscore the contrary effect that credit and quasi-debt management policies would have, by nature of their design, on market rates of interest. More precisely, in a monetary policy paradigm within which a central objective is the maintenance of stable, moderate interest rates in the medium to long term, policies designed to (temporarily) lower long-term interest rates (albeit affecting only forward rates) and to (temporarily) lower the cost of funding for households and corporations (with limited effect on the former and a negative effect on production activity of the latter), are clearly counterproductive and potentially detrimental.

It also appears evident that the intended effect of quasi-debt management and credit policies on asset prices is equally contradictory in a regulatory framework, discussed subsequently, designed to minimize domestic leverage cycles and to prevent the recurrence of financial crises. Specifically, policy-induced asset price increases, which reverse after approximately one year, stoke, rather than attenuate, asset price bubbles, augment corporate and household leverage via the wealth effect, create a number of negative dynamics in the financial markets that lead to weaker bank balance sheets, squeeze risk margins, encourage

the expansion of the financial, at the expense of the production, sector, and in so doing create precisely those dynamics captured in Minsky's description of the upswing of the leverage cycle that inevitably ends in a devastating systemic financial crisis.

3. Macprudential regulation

The monetary policy framework that this dissertation advocates envisages, therefore, a central bank that, in the absence of critical financial tensions, is limited in its activities to the conduct of daily defensive and accommodative liquidity management operations, with the intermediate goal of maintaining moderate, stable rates of interest in the medium to long term, and with the ultimate objective of promoting maximum sustainable rates of economic growth (and thus employment). A central bank operating in this framework hence has no policies at its disposal to actively manage dynamics responsible for the accumulation of endogenously-generated financial imbalances, so as to effectively pursue the additional critical objective of maintaining financial stability, a goal fundamental for the achievement of the aforementioned growth objective (see sections 2.6.1 and 5.2.2).

By logical reasoning, the task of ensuring financial stability must be relegated to the realm of macroprudential regulation, a policy sphere that has received abundant attention in academic, financial and political circles since the 2008 financial crisis. Minsky, even without the benefit of hindsight on the events and developments of the last 20 years, had warned of the urgent need to revise the financial system via regulatory policy, arguing in the early 1990s that “[o]nly capitalist economies in which the regulatory agencies have stronger and more sophisticated controls than the regulatory agencies have in the United States can avoid the financial excesses that bring financially complex economies to the brink of collapse” (Minsky, 1993, p. 20). The purpose of this section is to briefly evaluate several regulatory reform initiatives and proposals in the theoretical framework constructed thus far, and to conclude on their (potential) effectiveness in altering sufficiently the workings of the financial system so as to mitigate substantially the risk of a systemic financial crisis that Minsky's framework predicts.¹⁵⁰

The scope of our analysis here is greatly limited given the complexity of the subject. In the words of Panzera (2015, p. 176), “designing a comprehensive framework for macroprudential policy suffers the same difficulties as establishing a framework for financial

¹⁵⁰ For an evaluation of Minsky's own contribution to the elaboration of a proposal for a dynamic macroprudential regulatory framework see Kregel (2014b).

stability” given that “the broadly defined goal of macroprudential policy is to safeguard financial stability, which by itself is an elusive concept devoid of any analytical and operational framework”.¹⁵¹ The analytical framework developed by Panzera (2015) for the purpose of evaluating macroprudential policy alternatives is clearly structured, effective and comprehensive, and we rely on his categorization of intermediate macroprudential policy objectives and related market failures (p. 194) to briefly consider the most relevant (for our purposes) source of financial instability and several related policy alternatives. To this extent, our analysis focuses on the ‘time’ dimension of systemic risk, and, more precisely, on the process of credit expansion that occurs during the upswing of the financial cycle, increasing its amplitude and the potential severity of damage that the financial system and the production economy suffer when the accumulated financial imbalances eventually unwind.¹⁵²

The first policy we evaluate is the Countercyclical Capital Buffers (CCyB) initiative, the most recent addition to the US Federal Reserve’s regulatory policy toolkit, introduced in June 2013 with the purpose of increasing the effectiveness of existing capital buffers and augmenting the manoeuvrability of macroprudential policy in managing credit supply and asset price inflation while diminishing key banking institutions’ vulnerability to stresses in the credit markets (Federal Reserve Board, 2016c, pp. 4-5, 21).

The CCyB initiative is an expansion of the existing minimum capital requirements and Capital Conservation Buffer (CCB) framework of banking regulation, the latter of which requires large and internationally active banking institutions to hold a buffer of common equity tier 1 capital of a minimum of 2.5 percent of risk-weighted assets over and above the minimum risk-based capital requirements, with banks breaching this level subject to limits on capital distributions and bonus pay-outs (*ibid.*, p. 4). The element of innovation that the CCyB introduces is the (intended) countercyclical nature of the policy, whereby CCyB would

¹⁵¹ The increasing size and sophistication of financial markets has greatly complicated the task of devising an effective, comprehensive, consistent and transparent regulatory framework, even in theory. We focus in our discussion on just one, albeit, in our view, the most important, dynamics of financial instability. We direct the reader to the following literature for a treatment of other issues central to the financial instability debate: shadow banking (Meeks et al., 2014; Financial Stability Board, 2015); the derivatives market (Panzera, 2015, pp. 119-128); securitization (Segoviano et al., 2013); masked illiquidity (Nesvetailova, 2008; Rennison & Hale, 2016); central bank bail-outs and moral hazard (Kuttner, 2007, pp. 5-6; Myftari & Rossi, 2007, pp. 12-13; White, 2013).

¹⁵² For the idiosyncratic perspective in the consideration of financial risks (inherent in a framework for microprudential regulation) see Panzera & Rossi (2011), Panzera (2015, pp. 205-212); in addition to the ‘time’ dimension considered here, Panzera’s categorization includes a complementary ‘cross-sectional’ dimension, which concerns the static aspect of the distribution of financial risks and imbalances across the financial sector at a given point in time (2015, pp. 190-191). Finally, within the ‘time’ dimension, this analytical framework envisages, in addition to leverage dynamics, a consideration of funding/liquidity risks, a further element not analysed here (for an elaboration on this subject, see Brunnermeier & Pedersen, 2009; Drehmann & Nikolaou, 2013).

be activated at times when the perceived “systemic vulnerabilities are meaningfully above normal” (*ibid.*, p. 21), and is expected to take effect via an alteration in banks’ behaviour to the extent that “institutions might react to an increase in the CCyB by raising lending standards, otherwise reducing their risk exposure, augmenting their capital or some combination of those actions” (*ibid.*, p. 25).

There are a number of reasons to argue that the CCyB initiative, while constructive in its objective to prevent the inflation of asset price bubbles and to limit excessive leverage creation during the upward phase of the leverage cycle, is likely to be suboptimal in its implementation and effectiveness. A common concern raised by critics centres on the challenge involved in diagnosing vulnerabilities using a variety of possible indicators (Panzera, 2015, pp. 155, 196-198; Federal Reserve Board, 2016c, pp. 26-27) and in releasing the buffer in a timely manner (Drehmann et al., 2010, p. 26; Borio, 2011b, p. 12). Furthermore, the use of certain indicators, for example the private sector credit-to-GDP ratio, albeit judged by multiple sources as the most informative single indicator available (Basel Committee on Banking Supervision, 2010; Drehmann et al., 2010, p. 31), might prove to be procyclical at times when changes in the ratio are caused by a slowdown in GDP growth, rather than an increase in private sector leverage (Repullo & Saurina, 2011, pp. 4-5).

The most significant inadequacy of this policy, however, is the general, untargeted nature in which CCyB, if effective, would impact the expansion of credit, and the risk that it will actually distort the distribution of leverage in a way that would negatively impact production activities. For example, increasing risk aversion may lead to a heavier emphasis on collateralized or short-term consumer credit at the expense of riskier loans to the corporate sector needed to fund production activities, thus negatively affecting the *composition* of the banking sector’s credit portfolio, while profitability pressures as a result of higher capital requirements, which would affect a large number of banks simultaneously, might increase the *quantity* of low-risk (unproductive) lending, as banks try to increase the profitability of their credit portfolios. Individual banks, for which competitive pressures arising out of the profitability squeeze prevail over the concern for lowering the risk-weighted capital ratio, may actually respond by lowering lending standards in an effort to attract additional business and increase profit (see section 4.3.2).

A valid alternative, one which may allow the circumvention of some of these criticisms and which offers greater flexibility in its ultimate design and implementation, is represented by the proposal for Asset-Based Reserve Requirements (ABRR), most notably advocated by Palley (2004, 2014) and D'Arista (2009). The ABRR regulatory approach involves the

introduction of adjustable margin requirements applicable to a range of assets held by financial institutions. The regulatory authority would have the responsibility of altering the respective margin requirement so as to prevent asset price bubbles and the emergence of financial imbalances related to specific categories of financial assets. The theoretical benefit of this strategy in comparison to policies aimed at managing the liabilities size of banks' balance sheets, such as capital buffers (including CCyB), is the enhanced flexibility, pro-cyclicality and increased precision with which this policy, it is argued, could be used to limit the expansion of particular categories of assets and, more generally, to stall excessive growth of the financial sector (Palley, 2014, pp. 5-6, 8).

Given that this policy has not actually been implemented to date, there remain significant uncertainties with respect to its actual impact on the functioning of the interbank markets and on banks' behaviour. First, given that in the aggregate there can never be a shortage of reserves, which the central bank provides to the banking sector on demand, the ultimate impact will be on the *relative* profitability of 'targeted' assets, and would need to be sufficiently large so as to limit the banking sector's creation of those assets. Furthermore, if banks were to react by simply raising the cost to the borrower of the respective asset (say, consumer credit), one would need to evaluate the characteristics of the demand side (that is, consumer behaviour) in order to issue a judgement as to the benefits of this effect. In a pessimistic scenario, it may be, for instance, that an increasing cost of consumer credit during the phase of rising financial imbalances would dampen demand for loans by the less debt-dependent (more risk averse) portion of the household sector, while having an insignificant effect on the more debt-dependent (less risk averse) households. The rising cost of assets at a time of increasing financial instability may potentially mark the tipping point of the leverage cycle, as described by Minsky, thus precipitating, rather than preventing, the occurrence of a subsequent systemic financial crisis.

But while these considerations represent purely hypothetical deliberations, more immediate and concrete concerns with this policy have also been raised. As with the CCyB policy, ABRRs pose significant challenges in terms of monitoring the emergence of asset bubbles and reacting in a timely, proportionate and targeted manner. For example, the problem of developing individual criteria for the evaluation of possible bubble dynamics in various sectors, as well as the issue of cross-sectoral industry operations, are highlighted by Myftari and Rossi (2010, pp. 378-379) and the proved ability of banks to circumvent regulatory restrictions by resorting to financial innovation is mentioned by Panzera (2015, p. 245). Furthermore, the possible negative impact on the process of expectations formation of

variations in the cost of credit across sectors, which would result from changes in ABRR policy, is another important consideration.

In contrast to the hereto-considered policies, the underlying principle that is to monitor and react to the emergence of financial imbalances by altering the behaviour of banks, borrowers and financial market players via regulation, the final proposal we consider suggests the possibility of eliminating leverage cycles and averting the related, endogenously-generated systemic financial crises (Cencini & Rossi, 2015, pp. 238-240). The achievement of this monumental goal involves the elimination of the structural flaw in the domestic payments system, so as to prevent banks from creating money in excess of income generated in the production economy, and is based on the analysis of Rossi and Cencini introduced earlier. In order to create a concrete (bookkeeping) distinction between money emitted for payments related to income-producing activities and credit provided for payments that result in the transfer of an existing income (to wit, to the financial markets for speculative activity), the proposal envisages the separation of banks' bookkeeping departments, with one department tasked with monetary (money) emissions and the second with financial (credit) transactions.¹⁵³

The proposed arrangement would eliminate the possibility of banks to “exploit their loans-make-deposits causal mechanism to enhance their activities on financial markets, underestimating risk as well as encouraging asset bubbles and excessive leverage” (Rossi, 2011a, p. 67). By relegating the task of money creation (to wit, the advancement of initial finance to entrepreneurs and corporations for the payment of wages) to the monetary department, the system would guarantee a direct association between the newly generated loan (a debt of the firm) and the newly-created deposits (a credit of wage earners), the purchasing power of which is guaranteed by the eventual production of goods and services, whose subsequent purchase by the wage earners allows the borrowing firm to pay off its initial loan with the bank (*ibid.*, p. 68).¹⁵⁴

All (non-income generating) transactions that a bank carries out for its own books or on behalf of its clients via the financial markets would be recorded by its financial department, and would be limited by the amount of existing deposits (either owned or borrowed by the bank), thus eliminating the possibility of the (inflationary) issuance of money in excess of the income created within the economic system. Crucially, this separation of banks' activities

¹⁵³ For a detailed exposition of the precise accounting mechanisms of this arrangement see Rossi (2007, pp. 127-132) and Cencini & Rossi (2015, pp. 226-240).

¹⁵⁴ For an elaborate discussion of circuit theory, which illustrates the importance and precise nature of these macroeconomic relationships, see Chapter 2 in Rossi (2007) and Rossi (2009a).

would guarantee that “the money-output relationship established on the factor market through the payment of wages [...] is left unaffected by those financial market operations that banks may carry out for their clients or for their own sake” (Rossi, 2011a, p. 74).

The main criticisms¹⁵⁵ that one may leverage against the proposal for the elimination of the monetary-structural flaw of current domestic payment systems as described above are entirely unrelated, as in the case of the other proposals we discussed, to the possibility that the policy may fail by design in achieving its objective of promoting systemic financial stability or, in the even more problematic scenario, that it may have unintended negative effects on economic agents’ behaviour. On the contrary, the proposed arrangement would guarantee the elimination of “the pathological process leading to the creation of a purely nominal capital deprived of any real content” (Cencini & Rossi, 2015, p. 239), thereby eradicating speculative activities carried out on the basis of such capital across the financial markets. Only by eliminating this flaw can regulatory reform hope to effectively address the related problems of financial speculation, leverage cycles, asset price bubbles and the inevitable (in the current system) occurrence of periodic, devastating financial crises, which inflict lasting damage on the endogenous, path-determined growth dynamics, and which render monetary policy entirely ineffective in achieving the objective of promoting maximum sustainable rates of employment and long-term economic growth.

¹⁵⁵ The main criticism that currently seems indisputable is that the implementation of such a comprehensive revision of the existing domestic payments system would require a significant amount of political will, as it involves the adoption of a theoretical macroeconomic perspective that stands in stark juxtaposition to the prevailing mainstream paradigm. Further concerns regarding the eventual success of this policy relate to the possibility of banks circumventing domestic constraints by resorting to international-level arbitrage, making it preferable that such reform take places multilaterally (Panzera, 2015, pp. 254-255).

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Nearly a decade after the collapse of Lehman Brothers and the start of the most severe economic recession since the 1930s, US economic performance remains lacklustre and the Great Moderation, believed for a blissful period to be a new norm ushered in by successful monetary management, has become a phase of US history, much like the Great Depression of the 1930s, the Great Inflation of the 1970s and the Great Recession of the post-2007 years. This has raised important questions with regards to the role of monetary policy in the modern economy, the validity of the inflation-targeting framework that governs the Fed's policy design and implementation, and the mechanisms via which changes in the monetary policy stance are transmitted to the financial sector and the economy as a whole.

The hypothesis, examined and tested in this dissertation, of fundamental monetary policy ineffectiveness in stimulating economic activity in the aftermath of a financial crisis and in the context of a post-crisis recession, has been widely supported by both the theoretical and empirical analysis of this research work. In evaluating the causes of the post-crisis stagnation, which has persisted in spite of unprecedented (in scope, size and duration) monetary policy stimulus, we delineated a threefold characterization of the dynamics that have produced the necessary conditions for this enduring trend in economic growth.

First, long-term structural dynamics, including rising income inequality, growing sectoral imbalances and an increasing profit share, have eroded economic resilience, impacting the ability of aggregate demand to recover from a recessionary period. Second, the financial crisis has inflicted significant damage on the US economy and has resulted in post-crisis dynamics that act to depress aggregate demand via a number of channels. These include temporary deleveraging and persistent negative corporate and household expectations, which are validated from period to period by the continuation of economic stagnation, result in depressed consumption and investment, and in turn lead to weak capital accumulation and innovation trends. Finally, financialization dynamics, which have been gaining momentum since the 1980s, have created a debt-driven economy characterized by a continuous Minskyian debt cycle, punctuated by financial crises that have detrimental effects on aggregate demand and are followed by anaemic recoveries. To this end, the current stagnation phase is likely to end with the beginning of a new (temporary) debt-driven consumption boom that will subsequently lead to a systemic financial crisis, which, in turn, will be followed by a protracted period of stagnation.

The detailed analysis of hypothetical channels of monetary policy transmission in the post-crisis period has supported this characterization of recent macroeconomic dynamics. Chapter 3 examined monetary policy transmission via interest rate and balance sheet channels. The analysis in this chapter illustrated the incoherence of traditional neoclassical formulations of corporate investment channels, including the *corporate fixed capital investment* and *inflation expectations and corporate investment* channels in the context of an extended period of falling interest rates, stable or falling inflation expectations, and simultaneously falling private business investment as a percentage of GDP. Existing empirical evidence further discredits these formulations of monetary policy transmission by suggesting the prevalence of aggregate demand over cost considerations in corporate investment, and the interest insensitivity of investment plans, contrary to the assumptions of the aforementioned transmission channel theories.

Our examination of the *term premia and corporate borrowing* channel suggested that, while monetary policy may have been successful to some degree in temporarily lowering interest rates at the longer end of the yield curve, as evidenced by existing empirical research, this has not translated into increased investment by corporations. Rather, companies have restructured, increasing the average maturity of existing debt, and augmented the proportion of fixed-rate loans thereby locking in low long-term rates of interest. Furthermore, although corporate profitability has benefitted dramatically from low interest rates, allowing corporations to drastically increase cash holdings since the crisis, this has not resulted in an increasing allocation of profits towards fixed investment and innovation. Rather, corporations have chosen to distribute a greater portion of earnings to shareholders via dividend pay-outs and share buybacks, a trend supported by increasing corporate leverage as a result of the protracted period of low interest rates. In the meantime, low, by historical standards, corporate investment has persisted as a result of weak aggregate demand, with the temporary reduction in term premia at the long end of the yield curve powerless to counter this dynamics.

The lowering of the short-term rate of interest to near-zero levels in the US economy has also been ineffective in stimulating corporate investment, according to our analysis. NPV decision rule hurdle rates, which tend to be set well above break-even rates at times of economic uncertainty, not only did not fall as a result of the reduction in the policy rate of interest, but were, on average, increased by corporate managers. As for the effects of falling interest rates on firm valuation and the resulting increase in asset prices, or the *equity financing* channel, we concluded that the same firms that benefit from a temporary increase

in the value of their stock during the phase of stimulative monetary policy are also put at risk of a future correction in the equity markets when the monetary policy stimulus is wound down, and hence policy acting via this channel is counterproductive and damaging in the longer term. Mounting financial fragility in the non-financial corporate sector is already evident in the post-2007 data, which we analysed in the third chapter.

In Chapter 3 we also evaluated household consumption channels, which further supported the hypothesis of monetary policy ineffectiveness, as at the aggregate level consumer spending responded poorly to the unprecedented low interest rate policy, with saving rates remaining above pre-crisis levels as of the end of 2014 and real personal consumption levels generally remaining significantly below those witnessed before the crisis, in spite of record-low overall household debt service costs and household debt at pre-2008 crisis levels. The *rational expectations and intertemporal substitution* channel of transmission warranted scant attention, given the general absence of inflationary pressures or expectations for rising future inflation rates in the current data. Empirical evidence presented in the context of the *cost of real estate capital* channel also illustrated the disconnect between theory and empirical trends in light of a high proportion of fixed rate mortgages in the United States and an important trend of mortgage repayment amongst households since the crisis and through 2014. Overall, the trends are symptomatic of strained household balance sheets and a deleveraging predominantly in the market for real estate, in spite of record-low interest rates and falling housing prices.

Our consideration of the *household credit (cash flow)* channel led us to conclude that, for most of the post-crisis decade, household deleveraging prevented the effects of stimulative monetary policy from showing up in leverage and consumption trends as a result of increased precautionary saving amongst households in light of economic uncertainty. Furthermore, in principle, policy that encourages mounting household leverage is effectively contributing to the creation of financial imbalances that ultimately lead to a subsequent financial crash. In fact, our examination of a number of relevant data series offered undeniable evidence for the emergence of a significant gap in the level of household mortgage debt and the value of real estate, as well as the growing divide in both of the latter variables with the growth in GDP over a corresponding time period.

Finally, Chapter 3 considered the effects of the Fed's balance sheet policy's impact on asset prices, which theory suggests may increase, thus stimulating aggregate demand via the *equity financing* channel, which relates to corporations, and the *real estate collateral* channel, which considers household sector dynamics. On the whole we concluded that, although the

central bank's balance sheet policy most likely did support equity prices, possibly temporarily benefiting some small, equity constrained firms, in the aggregate equity issuance has continued to fall to historically-low levels in spite of this policy, compensated by a corresponding increase in the issuance of corporate debt. At the same time, the effect on households was minimal, as the pass-through rate of lower interest rates from MBS securities to household mortgage products was hampered by a number of important frictions, with the primary beneficiaries of the direct effects of the central banks' purchases of MBS being loan originators rather than mortgage holders.

Our conclusion of monetary policy ineffectiveness via interest rate and balance sheet channels left open the question of potentially valid transmission mechanisms active via the banking sector. To this purpose, Chapter 4 considered the interaction of monetary policy with commercial banks in a number of hypothetical bank lending channels. We illustrated that, in spite of the drastic increase in total deposits as a percentage of liabilities of the aggregate banking sector in the years since the crisis, the quantity of loans as a percentage of total assets has been decreasing, an empirical fact that contradicts the theoretical assumptions of the *liquidity buffer view* of monetary policy transmission. In our evaluation of the *external finance premium view* of the bank lending channel we found a positive, rather than the presumed negative, correlation between banks' cost of funding earning assets and the total quantity of loans as a percentage of total assets, also contrary to this theoretical mechanism formulated in the context of the misguided loanable funds approach to monetary policy analysis.

With regards to the third hypothetical mechanism based in the loanable funds theory, to wit, the *leverage ratio view*, and in addition to the empirical evidence presented in the context of the prior two formulations of bank lending channels, which contradicts the assumptions of the leverage ratio view hypothesis, we illustrated the empirical disconnect between liquid assets as a percentage of total assets, which have been on the rise since 2007, and total loans as a percentage of assets, which have been falling rapidly for most of the same period. In fact, it is most logical to view loans and liquid assets as alternatives to one another rather than complements whereby the increase in liquidity 'causes' an expansion of the aggregate loan portfolio, as the leverage ratio theory supposes. The alternative presumption of this view, specifically, that an easing of capital constraints in the aggregate would result in greater lending by banks to non-financial corporates and households, is also negated by empirical evidence, which shows a negative correlation between the Tier I capital ratio,

which has been improving for the aggregate banking sector since the financial crisis, and the loans-to-assets ratio, which has been decreasing in spite of banks' improved capitalization.

In Chapter 4, we also considered alternative formulations of bank lending channels, beginning with a critical evaluation of the *asset price support* channel, which considers the effects of the Fed's balance sheet policies on the prices of assets held on the aggregate banking sector balance sheet, the resulting improvements in capitalization ratios and the consequent hypothetical increases in lending to the private sector. In the context of empirical evidence on the temporary nature of policy-induced asset price increases and the assets/liabilities duration mismatch that is inherent to the structure of banks' balance sheets, our analysis leads us to conclude that the effects of such changes to asset prices are manifested via an increased level of risk on the assets side of banks' balance sheets, a dynamics we refer to as the *risk-taking channel* of monetary policy transmission. We presented empirical evidence for an increase in the risk-weighted assets to total liabilities ratio of US banks in the period between 2012 and 2016, which occurred alongside a gradual fall in the yield on earning assets ratio since the crisis.

The final bank lending channel that we considered is the *liquidity effect of reserves* channel, which suggests that the additional liquidity created within the banking sector as a result of the latter acting as an intermediary in transactions between the non-financial sector and the central bank would result in increased lending by banks. Also in this case empirical evidence points to negative dynamics, rather than an increase in lending, occurring on both the assets and the liabilities sides of the aggregate banking sector's balance sheet, partially as a result of the Fed's asset purchases, which put temporary downward pressure on long-term interest rates, thus squeezing banks' profitability and creating negative 'search for yield' dynamics. Specifically, there is evidence of an increase in the percentage of uninsured deposits as a percentage of total deposits, which suggests a developing weakness in the bank funding structure. At the same time, the percentage of assets with a duration of over five years as a percentage of total assets has been on a steep rise since 2009, creating an important mismatch in the stability of funding sources and the maturity of the loan portfolio.

To the extent that our initial hypothesis of monetary policy ineffectiveness was overwhelmingly supported by both the theoretical as well as the empirical analysis, we concluded that the central bank, in the absence of critical financial tensions, should be limited in its activities to the conduct of daily defensive and accommodative liquidity management operations, with the intermediate goal of maintaining moderate, stable rates of interest in the medium to long term, and with the ultimate objective of promoting maximum sustainable

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rates of economic growth. A central bank operating in this framework would thus have no policies at its disposal to actively manage dynamics responsible for the accumulation of endogenously-generated financial imbalances, so as to effectively pursue the additional critical objective of maintaining financial stability, a fundamental goal for the achievement of the aforementioned economic growth objective.

In contrast to most existing initiatives and policy proposals, the underlying principle of which is to monitor and react to the emergence of financial imbalances by altering the behaviour of banks, borrowers and financial market players via regulation, the policy that this dissertation advocated suggests the possibility of eliminating leverage cycles and averting the related, endogenously-generated systemic financial crises altogether. The achievement of this monumental goal involves the elimination of the structural flaw in the domestic payments system, so as to prevent banks from creating money in excess of income generation in the production economy. In order to create a concrete (bookkeeping) distinction between money emitted for payments related to income-producing activities and credit provided for payments that result in the transfer of an existing income (to wit, across the financial markets for speculative activity), the proposal envisages the separation of banks' bookkeeping departments, with one department tasked with monetary (money) emissions and the second with financial (credit) transactions.

Clearly, the challenges involved in such a wholesale revision of the existing structure of banking sector accounting are significant. But first and foremost this reform requires the acceptance and the adoption of an alternative theoretical framework for macroeconomic and monetary analysis, advocated in this dissertation, as well as a wholesale revision of the existing paradigm governing central bank policy making. The post-Keynesian school of thought offers a valid alternative to the New consensus macroeconomics paradigm for economic analysis. This heterodox paradigm advocates an appreciation of the nature of economic growth dynamics within a monetary production economy, central to which are the profitability-motivated creation of endogenous credit money by the banking sector, a demand-determined level of output, corporate investment as a fundamental determinant of long-term economic growth, the possibility of multiple long-term employment equilibria and a comprehensive theory of leverage cycles and financial crises, which threaten the long-term health and the rate of endogenous growth of the economy as a whole.

Undoubtedly, the proposed undertaking is monumental. However, while it is true, as in the words of Italian diplomat and political theorist Niccolò Machiavelli (1515), that “there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its

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success, than to take the lead in the introduction of a new order of things”,¹⁵⁶ a failure to embark on this challenging task in a timely manner likely comports far greater perils, and the economics discipline might indeed crystalize in its unfortunate and dispensable reputation as the ‘dismal science’.

¹⁵⁶ Machiavelli, N. (1515), *The Prince*, translated by W.K. Marriott, The University of Adelaide ebook, Chapter 6. Available at <https://ebooks.adelaide.edu.au/m/machiavelli/niccolo/m149p/complete.html> (last accessed on 25 August 2017).

APPENDIX

Table 1 Overview of permanent and temporary monetary policy facilities.

FACILITY	CATEGORY	AIM / DESCRIPTION	DATES
Open Market Operations (OMOs)	Daily management of reserve balances	Purchase and sale of securities in the open market. Permanent OMOs involve an outright purchase or sale, which permanently changes the composition of the Fed's balance sheet. Temporary OMOs involve either a repurchase agreement (repo – the purchase of a security with the agreement to resell at a premium reflecting accrued interest) or a reverse repo (RRP – the sale of a security with the agreement to repurchase at a predefined date in the future).	
Discount window – broadening of terms	Short-term crisis measure	Provision of short-term liquidity to banks and depository/financial institutions by Fed acting as lender of last resort. Revision of lending terms including extended maturity and list of acceptable collateral	
Term Auction Facility (TAF)	Short-term crisis measure	Provision of short-term liquidity to banks and depository institutions eligible for primary credit by the Fed acting as lender of last resort. 28-day and 84-day maturity credit provided through an auction mechanism.	Dec 2007 – Apr 2010
Primary Dealer Credit Facility (PDCF)	Short-term crisis measure	Provision of short-term liquidity to primary dealers by Fed acting as lender of last resort. Fully-collateralized credit provided overnight to ease strains in the triparty repurchase agreement market.	Mar 2008 – Feb 2010
Term Securities Lending Facility (TSLF)	Short-term crisis measure	Fed acting as lender of last resort for primary dealers facing liquidity constraints. The Fed loaned liquid Treasury securities in exchange for less liquid collateral from the eligible collateral list with the aim of creating liquidity in the market for collateral and thus easing funding conditions for primary dealers.	Mar 2008 – Feb 2010
Commercial Paper Funding Facility (CPFF)	Normalization of financial markets via regeneration of market liquidity and asset price support	Provision of liquidity to borrowers/investors in select credit markets. FRBNY, via a specially-created limited liability companies, purchased from businesses highly-rated, USD unsecured and asset-backed 3-month maturity commercial paper (which MMMF and other investors were reluctant to purchase during the crisis). Aimed at reviving the commercial paper market.	Oct 2008 – Apr 2010
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity	Normalization of financial markets via regeneration of market	Provision of liquidity to borrowers/investors in select credit markets. Designed to support the price of asset-backed commercial paper (ABCP) and to provide a market for ABCP which MMMF were under pressure to sell as they faced significant redemptions during the	Sept 2008 – Feb 2010

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Facility (AMLF)	liquidity and asset price support	crisis. Program eventually limited to MMMF facing ‘material’ outflows. The Fed provided nonrecourse loans to participating US banking institutions which bought eligible ABCP, with the ultimate aim of maintaining the health and credibility of the MMMFs and financial markets in general.	
Money Market Investor Funding Facility (MMIFF)	Normalization of financial markets via regeneration of market liquidity and asset price support	Provision of liquidity to borrowers/investors in select credit markets. Designed to complement the AMLF in providing liquidity to MMMFs in order to maintain investor interest in these funds and to allow MMMFs to meet redemption requests. Health of the MMMFs is seen as fundamental to the overall credit conditions as banks frequently tap the money markets for effective liquidity management.	Oct 2008 – Oct 2009
Term Asset-Backed Securities Loan Facility (TALF)	Normalization of financial markets via regeneration of market liquidity and asset price support	Provision of liquidity to borrowers/investors in select credit markets. Federal Reserve loans extended to buyers of AAA-rated ABS, with a haircut off the total market value of the ABS, backed by newly and recently originated consumer and small business loans. Designed to stimulate the crisis-stricken ABS market that is seen as fundamental to the smooth functioning of the market in credit to consumers and small businesses.	Initiated Mar 2009; new loan extension ceased in Mar 2010; last loan matured in Oct 2014; program closed in Dec 2014.
Purchase of agency-guaranteed MBS		Promote credit market liquidity via extension to traditional OMOs, exert downward pressure of longer-term interest rates and support mortgage markets. Involved a large-scale acquisition of fixed-rate agency MBS (guaranteed by Fannie Mae, Freddie Mac or Ginnie Mae).	From Nov 2008 (ongoing under reinvestment program)
Purchase of long-term Treasury securities & Maturity Extension Program		Promote credit market liquidity via extension to traditional OMOs, exert downward pressure of longer-term interest rates and improve conditions in private credit markets. The maturity extension program involved the purchase of Treasury securities with a maturity of between 6 to 30 years.	Mar 2009 – Dec 2012

Source: Federal Reserve.

APPENDIX

Table 2 Anecdotal evidence of changes in perception of monetary policy effectiveness.

Date	Author	Title & Link	Key phrase
6.9.2016	David Keohane	Kuroda on the adverse effects of the NIRP and a 'quiet riot' in JGBs.	A more sinister view of the reversal in JGB prices is that the markets have begun to realize that the 'frontier' in QE policies is drawing to a close...There may be an acknowledgement that the authorities are determined to raise the inflation rate through an income and wages policy and/or nominal GDP targeting. This would entail a more government led approach to exiting deflation than necessarily an entirely monetary one.
6.9.2016	John Plender	Bank of Japan's errors threaten lasting scar for central banks	There is a growing conviction in the markets that for the world's hardest pressed central banks there is no alternative to a helicopter money drop. <i>[In other words, a fiscal transfer directly to consumers.]</i>
6.9.2016	Mohamed El-Erian	Central bank market influence is changing and likely to wane	Nowadays, the market influence of central banks is in the process of changing and will probably wane. This is not because they are all getting out of the business of boosting asset prices. They are not. Rather, it is because policies are becoming more divergent and potentially less effective.
5.9.2016	Elaine Moore	The shadow hanging over historic rally for gilts	"We are reaching a point at which most people are now calling for the baton to be passed from monetary policy to fiscal policy," says Charles Goodhart, professor of finance at the London School of Economics and a former member of the BoE's rate-setting committee...There is little doubt that the market is already having this conversation.
31.8.2016	James Shotter	Weak inflation figures put pressure on ECB	The ECB's measures to inject more life into the regional economy — notably negative interest rates and large-scale asset purchases — have stoked much controversy, with German bankers warning that monetary policy was dangerously counterproductive.
30.8.2016	Mohamed El-Erian	Jackson Hole was a missed opportunity for a policy pivot	Central banks' policy tools alone are ill-suited to overcoming the challenges facing the US, and especially those of the European and Japanese economies given the nature of some of the structural headwinds. If the excessive reliance on central banks continues, there is a risk that the (Bernanke-specified) "benefits, costs and risks" equation will develop in a manner that involves consequential collateral damage and a broader range of unintended consequences — not only for the global economy but also for central banks' political autonomy, which would be at risk as they become visibly less effective.

APPENDIX

29.8.2016	James Staudt	Central bankers continue to push on the rope but the cart isn't moving	Loose monetary policy cannot produce productivity growth — the single most important factor in increasing a society's wealth. It cannot stimulate long-term demand growth. But it can distort markets, punishing anyone who is responsibly trying to plan for future obligations.
29.8.2016	Gavyn Davies	Sims highlights fiscal dominance at Jackson Hole	Viewed in this light, the ineffectiveness of QE in offsetting a chronic shortage of private demand is not that surprising. Certainly, QE helped reduce long-term interest rates, and that brought forward some demand from the future into the present. But once that process had ended (with bond yields close to zero), demand fell away.
29.8.2016	Makoto Ono	Jackson Hole is the place to call for a moratorium	As Benoît Coeuré, a member of the European Central Bank executive board, indicated in July — and as the Bank of Japan's decision to conduct a comprehensive assessment of its own policy implied — monetary policy in the US, Europe and Japan seems to be facing an economic lower limit, beyond which further accommodation becomes ineffective or even causes unintended negative effects on the economy and the financial markets.
28.8.2016	Sam Fleming	Central bankers fear threat of low-growth rut	But, beneath the surface at the Kansas Fed's annual symposium, many economists remained anxious. Their meetings highlighted worries about whether western central banks have sufficient scope to galvanise growth without help from other branches of government — and concerns over expectations piled on officials' shoulders as some experiment with radical measures such as negative interest rates... Agustín Carstens, the governor of the Bank of Mexico, says other branches of governments have to step forward. "What we are getting out of these discussions is that we are sort of reaching the limits. In many countries monetary policy activism has run its course."
21.8.2016	Michael Heise	Monetary policy lacks the muscle to boost growth	Not surprisingly, however, expansionary monetary policies have done little to fuel bank lending and private sector borrowing. Reviving lending after a financial crisis is like pushing on a string: central banks can smooth out the inevitable debt reduction process by cutting interest rates and pumping liquidity into the banking sector; but they cannot totally eliminate the need for companies, banks and households to pay down excessive debt. It usually takes years; this time is no different.
20.8.2005	Chris Giles	Speculative tale on BoE leaves out the right ending	It is this wider uncertainty that should be unsettling for the markets, not a perception that the MPC is somehow causing the problem. In any case, it is important not to exaggerate the Bank's influence on the economy. The Bank's forecasts show that if it had cut rates twice more, as the markets expected in July, inflation would have been only 0.13 percentage points higher after two years. Other events have caused it to surge by 1.2 percentage points in the past year.

Search of Financial Times archive for the periods 20 August – 6 September 2016 and 20 August – 6 September 2005, in both cases with a one week margin before and after the Jackson Hole Symposium of central bankers.

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