

**Institutional Change and Strategic Responses in Governance,
Political Participation, and Academia**

Cumulative
DOCTORAL THESIS

Presented to the Faculty of Management, Economics and Social Sciences at
the University of Fribourg (Switzerland)

by

Andre Briviba
(German)

in fulfillment of the requirements for the degree of
Doctor of Philosophy in Economics (PhD)

Accepted by the Faculty of Management, Economics and Social Sciences on
December 16, 2024 at the proposal of

Prof. Dr. Reiner Eichenberger (first referee),
Prof. Dr. Dr. h.c. mult. Bruno S. Frey (additional expert), and
Prof. Dr. Mark Schelker (second referee, chairman of the committee)

Fribourg, Switzerland, 2025

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Introduction & Summary of Research Results

Institutions are at the core of political economy, fundamentally shaping the interactions between society and economics. Douglass North's seminal work (1990) described institutions as the "rules of the game" that govern economic decision-making, emphasizing their critical role in shaping incentives and constraints on human behavior. North's seminal work, alongside contributions concerning institutions' role in economic growth (Acemoglu & Robinson, 2012; Alesina & Ferrara, 2005), intrinsic motivation (Frey & Jegen, 2001) and many more, highlight the importance of institutions in the functioning of societies, political, and economic systems. Institutions encompass a wide array of structures, including legal frameworks, regulatory bodies, social norms, and organizational practices. They are diverse and multifaceted, capturing formal and informal mechanisms that influence human behavior and economic activity.

Institutional change refers to the transformation of these rules of the game, norms, and structures that govern economic and political interactions. In general, institutional changes are necessary for the adaptation and sustainability of societies and democracies, particularly in response to rapid technological advancements, political reforms, and economic globalization. Institutional change involves the transformation of the underlying rules, norms, and structures that govern economic, political, and social interactions. This transformation can alter power dynamics, reshape organizational practices, and impact cultural values, thereby influencing behavior and outcomes in interdependent ways. Traditional economic models have often overlooked the negative consequences of institutional changes beyond purely economic indicators, not identifying the proper trade-offs between economic efficiency and factors such as citizens' political engagement. While these unconsidered trade-offs do not immediately affect economic outcomes, they can, in the long term, negatively impact overall economic performance.

However, changes in the institutional structure are typically accompanied by a change in the relative power structures of affected parties, especially in political institutions. In a functioning democracy, it is assumed that the population is reactive and capable of learning and adapting to new institutional frameworks, abstracting from a purely passive reaction to the new "rules". Hirschman's seminal work introduced Exit and Voice in dependence on loyalty as the two fundamental reactions to a decline in democracy or, in other words, an institutional decline in civic rights (Hirschman, 1970).

Understanding institutional change and the evoked responses involves exploring the mechanisms through which those changes work. Various factors influence institutional change, including economic pressures, political dynamics, social movements, and technological advancements. Seminal works highlight several key drivers of such institutional change, mostly referring to economic prosperity as the outcome measure of effectiveness. Economic crises often precipitate significant institutional reforms (Rodrik, 2011), while political shifts, such as changes in governance or political power, can lead to the redesign of institutional frameworks (Acemoglu & Robinson, 2012). Social movements and demographic changes also play a critical role, as

evolving societal norms and values demand new institutional arrangements to address emerging issues (Inglehart & Norris, 2016). Moreover, technological innovations require the adaptation of existing institutions or the creation of new ones to manage and regulate new technologies effectively (Brynjolfsson & McAfee, 2014).

A relatively new strand of the literature focuses on the interplay of culture and institutional change. Bisin and Verdier (2024) emphasizes the complex relationship between cultural evolution and institutional change, describing it as a co-evolution. Cultural values play a crucial role in shaping and reinforcing institutional frameworks, which in turn influence economic and political outcomes. Cultural transmission can also significantly affect the trajectory of institutional development and either enforce or mitigate the outcome inefficiencies. Many examples are found over the course of history and are well-known in the political economy literature (Putnam, 1993; Mokyr, 2016; Bisin et al., 2024).

This dissertation addresses critical questions about the impact of institutional changes on strategic behavior across three distinct but interconnected areas: governance, political participation, and academia. The interplay of society or affected groups and institutional change is of key interest and allows to infer conditions under which they result in an effective functioning and adaptation. By examining different stages of institutional development⁴ ranging from the creation of new institutions to the merging and creation of existing ones⁴ this thesis provides an understanding of institutional dynamics and their implications for economic and political outcomes.

This approach highlights the complex interplay between institutional frameworks, individual and organizational behavior, and societal outcomes. For instance, a municipality merger can be interpreted as a relative individual loss of power in the new community relative to the former state and aligns with a weaker incentive structure to participate politically. According to Verdier, the outcome also depends on the cultural traits of the local population and can either mitigate this effect or enforce it even more strongly (Bisin & Verdier, 2024). The strategic responses to institutional change by affected groups are crucial for understanding the impact of these changes.

Technological innovation is the core aspect of the first chapter and relates to the development and use of satellites and their sensitivity in capturing night light intensity. This development enabled whole strands of literature on night light intensity in different disciplines, such as remote sensing, development economics, and political economy (Medina and Schneider 2019; Martinez, 2022). Since the first academic analysis undertaken by Croft in 1978, economists have established a close correlation between the intensity of night light and the size of economic activity (Henderson et al, 2012; Martinez, 2022). Night light intensity has been established as a proxy of GDP for two major reasons. First, resources for statistically evaluating GDP are scarce in many developing economies. Using satellite images allows the statistical offices of such countries to obtain better insights into the size of regional and local GDP (Bhandari and Roychowdhuri 2011). The marginal costs are low because the night light data was not the primary reason for the existence of satellites. This spatially more granular analysis can also be of value when evaluating regional policy outcomes and the effectiveness of programs supported by international organizations, e.g., the World Bank and the

International Monetary Fund (Bundervoet et al., 2015). Second, night light intensity data serves as a tool to identify inconsistencies in official statistics, fundamentally altering the incentive structure of governmental data offices. <The growing popularity of night light data reflects either the absence or the presumed inaccuracy, of more conventional economic statistics, like national or regional GDP= (Gibson et al., 2020, p. 955). The night light intensity metric is assumed to be independent of government manipulation (see Gibson et al., 2020; Bluhm & Krause, 2022). Thus, the implications of new technology are manifold on many institutional dimensions. Not only does this alter the incentive structure of governments to manipulate data, but it also poses questions about the construction of an appropriate institution responsible for providing reliable data.

The second chapter describes the change in political institutions caused by the municipality merger in Glarus, Switzerland. In 2006, the canton, which consisted of 25 municipalities, was completely restructured into three. The radical reduction of municipalities aimed to increase efficiency and improve public service delivery. However, the merger led to a reduction in political engagement, as evidenced by a decrease in voter turnout on a national level. This chapter explores the mechanisms through which such a significant institutional change affects the responses of citizens regarding political behavior, focusing on the interplay between new governance structures and citizens' political participation.

The third and fourth chapter focus on the effect of institutional change in a systematically different environment of academia. These chapters explore how gradual changes in research evaluation systems and the increasing reliance on bibliometric measurements influence academic behavior and publishing strategies. The institutional change here is rather gradual than radical. Slow adaptation processes and potentially a vicious cycle of institutional structure and adapted behavior intensify the negative effects. Institutional changes in academia, such as the implementation of performance metrics, significantly alter the incentives and behaviors of researchers. These chapters investigate how these changes affect perceived publication pressure and publication strategies in academia. By examining these strategic responses, this research sheds light on the broader implications of institutional reforms in higher education and their impact on knowledge production. Understanding these strategic adaptations is essential for assessing the effectiveness and unintended consequences of current academic evaluation practices.

Chapter 1. Governments Manipulate Official Statistics: Institutions Matter

Many governments have been reported to systematically manipulate official statistics, a widespread issue that compromises the integrity of empirical research, policy advice, and governmental interventions. However, scholarly research has not extensively dealt with the determinants of data manipulation beyond the effect of autocracy. This chapter extends the literature by including institutional factors hypothetically affecting data manipulation. To test these hypotheses, we use night-light intensity captured by satellites to predict the economic output. We explain the deviation of <official= GDP from <true= GDP, predicted by night-time lights, with variables based on our hypotheses. For this purpose, we construct a panel-data set consisting of 195 countries from 2013 to 2019. The analysis is bolstered by robustness checks, including an

alternative outcome measure controlling for geography and further measures to differentiate political openness. The results reveal that economic openness and democracy generally reduce data manipulation. Decentralization increases it for the overreporting sample and has no robust effect in underreporting countries. Political openness shows heterogeneous effects for over- or underreporting samples; it increases manipulation in overreporting countries but decreases it in underreporting ones. Against our expectations, the effect of press freedom turns out to be unclear, which might be connected to the rise of social media lowering the explanatory power of traditional measures of freedom of the press. By shedding light on how different institutional arrangements affect the accuracy of official statistics, this research contributes to the political economy literature. It underscores the importance of constructing robust institutions to mitigate data manipulation and enhance the credibility of economic data for new data sources.

Chapter 2. The Impact of Municipality Mergers on Political Participation

This chapter examines the impact of municipality mergers on political participation, focusing on the drastic restructuring of communes in the Swiss canton of Glarus in 2006. The citizen assembly's decision to reduce the number of communes from 25 to three serves as a quasi-natural experiment, providing a unique opportunity to study the broader implications of such significant institutional changes. This research employs difference-in-difference (DiD) and synthetic control methods to analyze voting behavior in Glarus compared to neighboring cantons and the rest of Switzerland over the period 1991 to 2019.

The empirical analysis reveals a notable decline in voter turnout in Glarus following the mergers. DiD estimates indicate a decrease of approximately 4.4 to 5.5 percentage points, corresponding to a 10-11% reduction in voter participation. This trend contrasts with stable or increasing voter turnout in neighboring cantons and the rest of Switzerland. The synthetic control method supports these findings, showing a consistent and significant drop in voter engagement in Glarus relative to its synthetic counterpart. These findings highlight the complex interplay between institutional changes and political participation. The reduction in the number of communes led to structural shifts that disrupted local political dynamics and reduced residents' engagement with the political process. The results suggest that citizens' emotional and cognitive attachment to their local political entities is essential for maintaining high levels of participation. Additionally, the absence of gained economic efficiency emphasizes the importance of considering political and social dimensions in governance reforms. The results underscore the necessity to carefully balance efforts to improve administrative efficiency with strategies to preserve or enhance political engagement. By examining the effects of strategic institutional responses, the chapter aligns with the dissertation's broader theme, arguing for the development of resilient political institutions that can adapt to change without compromising democratic participation.

Chapter 3. Publish under Pressure 3 an Empirical Analysis of Academics' Strategic Behavior

The institutional structure of academia has been profoundly influenced by the shift from reputation-based assessments to metrics-based evaluation systems, a transition catalyzed by the New Public Management approach in the late 20th century. This shift has significantly altered the incentive structures within academia, impacting the behavior of various actors in this system. This chapter investigates the adapted publishing behavior of economics scholars, given that especially promotion committees' reliance on publication metrics generates publication pressure.

An extensive survey of university scholars at different stages of their academic careers was conducted in three countries: Germany, Austria, and (German-speaking) Switzerland. The results reveal that the subjectively perceived publication pressure is heavily dependent on the academic rank and reaches its maximum at the assistant professors without tenure. Furthermore, academics' journal selection strategy and resilience concerning rejections are investigated. Unexpectedly, scholars at German <Excellence Universities> compared to other universities in German-speaking countries do not feel more burdened, nor do they differ with respect to their journal submission strategy and the resilience to having papers rejected. Approaches to mitigate the adverse incentive structure, self-selection into the profession, and implications for promotion committees are discussed.

Chapter 4. Behind the Curtains of Academic Publishing: Strategic Responses of Economists and Business Scholars

Bibliometric measurements have become omnipresent and crucially important for academic career decisions, creating strong incentives that shape how academics allocate their time and efforts. This chapter empirically investigates the interactions between scientific journal metrics and the behavior of economics and business scholars in German-speaking countries, emphasizing the impact of various pressures on their decisions throughout the publishing process.

Based on a survey of economics and business scholars in German-speaking countries, this chapter empirically explores the interactions between scientific journal metrics and the behavior of authors in the publishing process. The impact different types of pressure have on their decisions is emphasized. In line with rational choice, authors generally move down in journal ranking as they resubmit their papers. While the process is highly influenced by random elements, the Scimago journal rank provides the best fit for the researcher's behavior. Doctoral students are under various restrictions and pressures and initially submit to lower-ranked journals compared to higher academic positions, which is likely due to the time pressure they face. The empirical findings improve our understanding of strategic responses in the scientific publishing process. Qualified lotteries, along with other institutional propositions, are suggested to mitigate adverse responses by academics.

Chapter 1. Governments Manipulate Official Statistics: Institutions Matter*

Abstract

Many governments have been reported to systematically manipulate official statistics. However, scholarly research has not extensively dealt with the determinants of data manipulation, beyond the effect of autocracy. This chapter extends the literature by including institutional factors hypothetically affecting data manipulation. Regressing the gap between GDP predicted by night-time lighting data and „official“ GDP on these institutional factors suggests that economic openness and democracy decrease manipulation, while decentralization increases manipulation. Political openness decreases manipulation for countries under-reporting GDP and increases manipulation for countries over-reporting GDP. Surprisingly, no effects are found for press freedom and the independence of the statistical office. Satellite-recorded data has the great advantage of being independent from national statistical offices and can, therefore, serve as an external correction mechanism.

1.1 Introduction

Winston Churchill is said to have quipped: *“I only believe in statistics that I have doctored myself”*. Reports in the media support this skeptical view of official statistics. European countries, such as Greece and Italy, have been accused of falsifying the size of their budget deficit and government debt in the context of entering the Euro system. Other countries, such as Argentina, Turkey, and China, have reportedly manipulated many official economic statistics.¹ How substantial these manipulations can be is demonstrated for Turkey. According to The Economist (2022d), “in late June a group of researchers put inflation in Turkey at 160%, double the official rate of 79%. A survey showed that seven out of ten Turks believed that group’s figures rather than the government’s.”

The scientific literature in economics and other disciplines has largely

* This chapter originated based on fruitful collaboration with Bruno S. Frey, Louis Moser, and Sandro Bieri. A version of this chapter has been published in Briviba et al. (2024) in the Journal of European Political Economy. We are grateful for insightful discussions with the participants of the EPCS Conference in Hannover, 2023, other seminars, and the support of the CREMA team.

¹ A collection of some media articles about this issue can be found in The Economist (2014, 2015, 2017, 2020, 2021a, 2021b, 2022b, 2022c, 2022a, 2022d)

disregarded the extent and determinants of the manipulation of official statistics. Even when authors discuss biased statistics, they rarely deal with governments' incentives for manipulation (e.g., Feldstein, 2017).

Knowledge about the true state of an economy is important for various reasons. Policymakers themselves are induced to undertake mistaken interventions in the economy if the data upon which decisions are taken is incorrect. This holds even if they know that manipulations have been undertaken, as they are not precisely informed about the current economic situation. Actors on a lower level of the state hierarchy may be less informed about the manipulations and may take the official statistics to reflect the actual conditions of the economy. This again tends to bias governmental interventions.

International organizations may, likewise, undertake mistaken policies if a country reports manipulated data. For instance, they may hand out subsidies and aid programs, which are too high than what would be correct in view of the real state of the recipients' economies. Moreover, countries could be included in newly established monetary systems, although they do not meet the requirements.

Knowledge about the gap between the real and the officially communicated state of the economy is also important for research. Many empirical analyses, particularly econometric ones, employ officially published data to analyze and predict economic factors. If these data are systematically biased, a mistaken view of the economy and distorted predictions may result. Our paper seeks to contribute to a better theoretical and empirical understanding of data falsification. Building on political economic theory, we establish five hypotheses, which aim to explain why some governments more often manipulate official data than others. Specifically, we hypothesize that a country's openness, freedom of press, and independence of the statistical office decrease, and decentralization increases a country's incentives for manipulating official data. To test these hypotheses, we use night-time lighting captured by satellites to predict the economic output. We explain the deviation of "official" GDP from "true" GDP, predicted by night-time lights, with variables based on our hypotheses. For this purpose, we construct a panel-data set consisting of 195 countries for the years 2013 to 2019.

Our results suggest that economic globalization decreases data manipulation, while decentralization increases data manipulation. Both of these findings support our hypotheses. We find a negative relation between political globalization and data manipulation only for countries under-reporting GDP statistics. For countries over-reporting GDP, our analysis suggests that political globalization increases data manipulation. A similar heterogeneity applies to the alternative measure of international political openness, passport power. Its explanatory role is stronger and statistically significant in the overreporting samples, while it does not play any role in the underreporting samples. Finally, we do find that neither freedom of the press, independence of the statistical office, nor political rights are associated with data manipulation.

This article contributes to the yet relatively sparse literature on data manipulation by governments. While most of the current literature has focused on

democracy, electoral cycles, and dictatorship as causes of differences in data manipulation, we enrich the literature with additional political-economic hypotheses, which include different institutional elements. However, due to serious data and methodological limitations, our results should not be interpreted as necessarily being causal. Our contribution, rather, provides first correlational insight into hypotheses that go beyond existing research.

Section 1.2 outlines both the theoretical and empirical contributions to the literature on systematic data manipulation of official data. Subsequently, empirically testable hypotheses on the determinants of data manipulation are derived. Section 1.3 outlines the various variables and data sources. The methodology employed for this purpose is presented in section 1.4. Section 1.5 presents the empirical results, and section 1.6 is devoted to robustness checks. Section 1.7 concludes.

1.2 Literature

1.2.1 Theoretical Background

The way governments manipulate official data is discussed only scarcely in previous literature. Georgiou (2021) identifies the manipulation of official statistics as corruption, i.e., "acts committed [...] enabling leaders to benefit at the expense of the public good" (p. 86). By *acts committed*, he refers to manipulating statistical procedures by setting certain standards or controlling data sources. In the case of Russia, Kalgin (2016) analyzes data manipulation by two types of behavior. Bureaucrats were either found to be prudent and did not like to report a too high variation in their reported data. Such bureaucrats kept variation especially low when manipulating data, whereas others strategically inflated their numbers for better performance. With performance measurements and in the absence of other incentives for data manipulation, such as targets and rankings, it may be a dominant strategy for individual bureaucrats to keep a low profile by reducing the variation in the data reported. Going a step further, Aragão and Linsi (2022) classify four different types of data manipulation. First, outright manipulation refers to the situation where the true statistical figure is known, but the government pushes for the publication of different figures. Second, guessing the statistical number, even if it is not known. Third, using other statistical methods to achieve more convenient results. And fourth, intervening through taking indirect means, for example, by manipulating data sources before the statistical analysis is performed. If economic data is manipulated, it is likely through one of these four methods, as the authors show in case studies for Greece, Argentina, and Brazil. When manipulating official statistics, the most evident goal of governments is to cover up poor performance. However, as shown by Cronin and McInerney (2023), institutional arrangements such as specific fiscal rules also play a decisive role in the accuracy of fiscal forecasts.

The pressure to misreport official data can emerge both from within a country or on an international level. On one hand, governments control information by manipulating data to influence popular opinion (King et al., 2017; Lorentzen, 2014). On the other hand, pressure to manipulate statistics can be induced by international

organizations, for example, when there is a need to comply with international standards (Alt et al., 2014; Rauch et al., 2011; Dafflon & Rossi, 1999).

1.2.2 Empirical Studies

Estimating data manipulation has been a methodological challenge. Some authors try to detect manipulation with Benford's law (e.g., Bond et al., 2022; Adiguzel et al., 2020; Adam & Tsarsitalidou, 2022), which identifies anomalies in the occurrence of certain numbers. Other studies rely on surveys or interviews. Newer possibilities have emerged with the analysis of satellite data, where economic activity is approximated by satellite imagery. This allows to approximate "true" GDP or economic growth (Henderson et al., 2012; Ghosh et al., 2010; Hodler & Raschky, 2014; Chen & Nordhaus, 2011). The same method has also been applied to various other issues in economics, such as poverty (Jean et al., 2016), local wealth (Weidmann & Schutte, 2017), health (Ebener et al., 2005), and ecological economics (Sutton & Costanza, 2002). It is also used as a control variable in contexts where data on economic activity is not available on a subnational level.

A large share of the most recent empirical contributions focused on the manipulation of Covid statistics. Using Benford's law, it has been shown that reported Covid-19 cases were more likely to show signs of statistical manipulation in less democratic countries (Adiguzel et al., 2020; Adam & Tsarsitalidou, 2022) or countries with lower economic development (Balashov et al., 2021). Authoritarianism as a cause for statistical manipulation has often been mentioned in the literature also outside manipulated Covid-19 statistics. In an important recent study using nightlight satellite data, Martinez (2022) shows that the more authoritarian a state is, the more it tends to inflate its GDP growth rates. This result is supported by Magee and Doces (2015). Our approach is related to Martinez (2022), who exploits one certain threshold for low-income countries (IDA threshold) and derives extensive insights on the GDP composition affected. We contribute to this literature by focusing on additional institutional arrangements and their effects in particular. Moreover, we refer to our strategy of splitting the sample into over- and underreporting countries to investigate more general relationships and emphasize the determinants leading to manipulation.

Two factors are taken to increase the incentives for authoritarian states to manipulate official data: First, authoritarian states and countries with weaker democratic institutions have fewer constraints on the government. Therefore, there is less control over the correct use of data and application of statistical methods (Aragão & Linsi, 2022; Magee & Doces, 2015). Second, authoritarian states can experience much pressure in times of crisis as these regimes derive their legitimacy partly from good economic performance (Nathan, 2020). Developing countries are generally more prone to manipulate official data. Sandefur and Glassman (2015) provide survey and administrative data evidence on how, in African regions with lower economic development, two principal-agent problems lead to insufficient data quality. Statistics on economic progress are exaggerated because of the need to attract more donations.

Data revisions are one of the mechanisms to counter manipulated or incorrectly recorded official statistics. Employed for instance, by the WTO, those revisions can result in substantial changes. Kerner et al., (2017) provide evidence for low-income countries, concluding that in contrast to initial GNI statistics, ex-post revised statistics reflect less data management practices. However, these corrections not only apply to GNI statistics but also affect rainfall and conflict data. In this case, the revisions changed the postulated relationship of rainfall shocks causing civil conflict (Liang & Sim, 2019).

Other empirical studies do not focus on cross-country evidence but on case studies. Newspaper articles, as well as academic research, have especially focused on China (e.g., Deaton, 2013; Wang & Yang, 2021). A nightlight analysis shows that the prospect of career promotion increases the probability of county officials inflating local GDP numbers. However, this effect is less pronounced for county officials with more accountability (Chen et al., 2021). Two implications can be derived: first, accountability increases the reliability of public data; second, systematic data manipulation occurs when political leaders benefit from false data.

Democratic regimes per se are not exempt from manipulating economic data. Cases such as Argentina and Greece have often been suspected of falsifying official statistics. Coremberg (2014) reproduces Argentina's GDP data and finds that the reported GDP data is too high, putting into doubt that the country has the highest growth rates in South America. Greece, especially around the financial crisis in 2008/09, has also been found to manipulate economic data in order to comply with European Union criteria (Rauch et al., 2011). Many governments in the EU indeed engage in "creative accounting" (Milesi-Ferretti, 2004; von Hagen & Wolff 2006; Koen & Van den Noord, 2005).

Electoral cycles are another cause identified to pressure governments to manipulate official data. Martinez (2022) shows that the deviation from GDP estimated by nightlight data for authoritarian regimes is higher just before elections. A similar effect was also found for democracies (Alt, Lassen, and Wehner 2014). Further, times of crisis, characterized by low growth rates, appear to provide strong incentives for authoritarian governments (Martinez, 2022; Wallace, 2016) as well as democracies to manipulate data (Alt et al., 2014; Chan et al., 2019).

1.3 Hypotheses

Previous literature has shown that pressure from the international or domestic sphere can influence the incentives to manipulate official data. While most scholarly work focuses on factors making data manipulation more likely, institutional and economic factors can also make data manipulation less prevalent. Government actors having an interest in falsifying official data are constrained by various institutional and constitutional arrangements (Buchanan & Tullock, 1965). Democracy, for example, can be understood as a constitutional arrangement ensuring that the government acts in the interest of the population. Government actors are constrained in their desire to manipulate data in their own interest because they have to act in the interest of the public. Additional arrangements constraining

or encouraging data manipulation are discussed in the following.

One factor leading to lower levels of data manipulation could be the extent of openness of a country. Political openness, characterized by membership in international organizations, can result in higher compliance with international standards. When joining an international organization, the statistical bureau is assumed to follow the „codes of statistical practice“ agreed upon. Membership in the OECD, IMF, or the World Bank can constrain national statistical offices because international organizations monitor the work performed by a national statistical office. When the official data is questionable, it may be controlled by the data agency of the international organization or even collected by it, as was the case with the European Commission (European Commission 2009). This leads to our first hypothesis:

Hypothesis 1: *The more politically open a country is, the less official statistics are manipulated.*

Economic openness can pressure governments to report correct statistics. First, the more economically integrated a country is, the easier it is to reproduce government data. This was shown, for example, in the case of Myanmar (Kubo, 2012). Second, economic openness also improves the flow of information and can foster the growth of media (Yang & Shanahan, 2003). A well-informed civil society is better able to evaluate the current state of its national economy and is less likely to be misled by false statistics. These considerations lead to the second hypothesis:

Hypothesis 2: *The more economically open a country is, the less official statistics are manipulated.*

Domestic pressures to report correct national data can come from a free press. Large media corporations themselves are often engaged in collecting data and may question unreliable government data. They inform individuals, such as voters, members of interest groups, or even opposition parties, empowering them to take action against the government in power. A free press reduces the possibility of governments misreporting data as it can more easily be discovered and publicized. Evidence of a positive correlation between good statistical performance and freedom of the media has been reported by the World Bank (2021, p. 69). For the case of terrorist incidence, underreporting was found for countries that are more authoritarian and the press of which is less free (Drakos & Gofas, 2006). Thus, the third hypothesis reads as follows:

Hypothesis 3: *The greater the freedom of the press is, the less official statistics are manipulated.*

Other literature suggests a relationship between decentralization and data manipulation. However, the direction of this relationship is not clear.

On the one hand, the existence of subnational units with competencies to collect data could constrain the possibilities of central governments to manipulate data. For example, if government data represents an aggregate of subnational data, it is more difficult to manipulate. However, the same argument applies vice versa:

decentralization increases the scope for subnational entities to manipulate data or correlates with missing uniform standards, resulting in aggregation errors. Either way, decentralization increases the number of actors with their own interests and therefore, the potential of manipulation in general.

Most of the empirical evidence points in this direction. A study about performance reviews in Russia mentions the distrust of government officials in data from local departments (Kalgın, 2016, p. 119). Further evidence was found in African development data, where local officials manipulated their data to get more funding (Sandefur & Glassman, 2015). This shows that local governments can have incentives to misreport data in order to signal higher performance. Koen and Van den Noord (2005) show that the use of alternative statistical procedures and "gimmicks" is less often observed in more centralized countries. This leads to the fourth hypothesis:

Hypothesis 4: *The more decentralized a country is, the more official statistics are manipulated.*

The final hypothesis deals with the relationship between the statistical office's independence and the level of data manipulation. The main factors determining the extent of independence relate to the appointment of the top positions, fiscal autonomy, and regulations imposed by the government.

The World Bank (2021, p. 69) finds that the presence of an independent statistical office is correlated with better statistical performance. An independent national bureau of statistics is exposed to different incentives than the government, similar to an independent central bank. Furthermore, the process of publishing official data will become less arbitrary. This leads to the fifth hypothesis:

Hypothesis 5: *The more autonomous the official statistics bureau is, the less official statistics are manipulated.*

1.4 Data

In order to test the five hypotheses, we construct a panel dataset including the relevant variables for 195 countries spanning from 2013 to 2019. We limit ourselves to this period because data coverage is heavily limited before 2013. After 2019, GDP was highly affected by the Covid pandemic; therefore, the years after 2019 are excluded. The unit of observation is the country-year level. Summary statistics for all variables are shown in Table A1.8.

1.2.3 Dependent Variable

Nightlight Data: We use annual VIIRS Night-time Lights (VNL) V2, made available by the Earth Observation Group (Elvidge et al., 2021), as our estimate for true economic activity. Nightlight data has been shown to be a viable proxy for economic activity (Sutton et al., 2007; Chen & Nordhaus, 2011; Henderson et al., 2012), and has the benefit of not being an official statistic. Rather, it is independently and identically measured for all countries through remote sensing.

The annual VNL data are aggregated on a country level by taking the mean

of light values in each country's boundaries for each year from 2013 to 2019. The country boundaries are taken from Natural Earth (2009-2022). Because the distribution of night-time lights per country and year is right skewed, the data is logarithmically transformed.

GDP: As our measure of *official* GDP, we take GDP reporting from the World Bank (2022). This variable measures GDP on a country-year level in current US-\$. The dollar values of GDP are converted from domestic currencies for every year using single-year official exchange rates. Alternative conversion factors are used if the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions. The World Bank takes reports from national accounts and sometimes makes adjustments to match international standards. Again, we perform a logarithmic transformation of the data.

Other Measures of Data Quality: For robustness, we use additional measures of data quality. The Open Data Barometer (ODB) and the Open Data Inventory (ODIN) are used as dependent variables in robustness checks (World Wide Web Foundation, 2013-2017; Open Data Watch, 2015- 2020). ODB data is available for 2013 to 2016, and ODIN data for 2015 to 2020, which limits the robustness checks to these years, respectively. ODB and ODIN both measure the transparency, availability, and quality of official data, all factors that make data misreporting less likely. They are, however, not direct measures of data misreporting.

1.2.4 Independent Variables

Independence of Statistical Agency: Data on the independence of the statistical agency is taken from the Ibrahim Index of African Governance (IIAG) (Mo Ibrahim Foundation 2020). The IIAG data is, however, limited to African countries and not necessarily of reliable quality. The measure used indicates the degree of independence of the statistical office from the government in quarter-steps on a scale from 0 to 100.

Economic Openness: The measure of economic openness used is the de facto trade globalization from the KOF Globalization Index (Gygli et al., 2019; KOF Swiss Economic Institute, 2021). The variable comprises the percentage of trade in goods and services of a country's GDP and trade partner diversity.

Political Openness: Political openness is measured using de jure political globalization from the KOF Globalization Index (KOF Swiss Economic Institute, 2021). This measure comprises a country's membership in international organizations and treaties and the treaty partner diversity. Further, we introduce passport power as an alternative measure of international political openness. It reflects the number of countries citizens can travel to visa-free. To proxy internal political openness, we exploit the political rights score by the Freedom House. This index consists of the electoral process, political pluralism and participation, and the functioning of government.

Freedom of Press: The measure of press freedom used is the World Press Freedom Index

from Reporters Without Borders (2002-2022). This index provides a score between 0 (no freedom of press) and 100 (full freedom of press) for 180 countries around the world.

Decentralization: The Regional Offices Relative Power variable from the V-Dem Institute (2022) is used as a measure of decentralization.

1.2.5 Control Variables

Democracy: The Electoral Democracy Index from V-Dem is used to measure democracy (V-Dem Institute, 2022). This index captures the extent to which the ideal of electoral democracy is, in its fullest sense, achieved on a scale from 0 (no democracy) to 1 (full democracy).

Contribution to GDP by Sector: The contributions of the different economic sectors to GDP are controlled for, as different sectors are likely to emit different amounts of light (e.g., Bhandari and Roychowdhury 2011). A sector contributing greatly to GDP but emitting little light results in a difference in economic activity measured in night-time lights from official GDP. Our measure of the contribution of different sectors to GDP is taken from the World Bank (1990-2021). With this data, four variables can be created 3 each measuring the share of the respective sector in total output. The four sectors classified by the World Bank are agriculture, industry, manufacturing, and services.

Informal Economy: An extensive informal economy can also result in a deviation between economic activity measured by night-time lights and official GDP. This difference depends on the informal economy's light emissions, is generally not included in the official GDP measure, but can constitute a significant share of GDP (e.g., Ghosh et al., 2009). Our variable of the informal economy is from the World Bank (1990-2018). It is a dynamic general equilibrium (DGE) model estimate of the share of informal output of total GDP.

1.5 Methodology

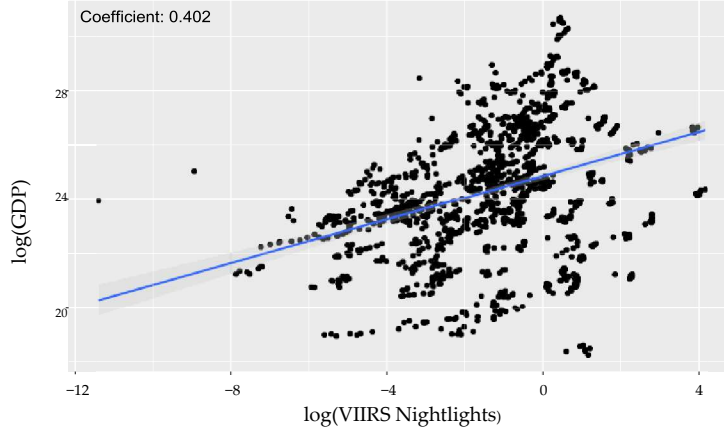
To test our hypotheses, we proceed in two steps. First, we estimate how much each country's official GDP statistic deviates from the one predicted by night-time lighting. Second, we differentiate between positive and negative residuals and explain these deviations with the variables suggested by our hypotheses. In the first step, official GDP is regressed on VIIRS night-time lights via OLS²:

$$gdp_{c,t} = \alpha + vnl_{c,t} + y_{c,t} \quad (1)$$

² In addition to the original first stage regression ($gdp_{c,t} = \alpha + vnl_{c,t} + y_{c,t}$), we also include the measure of informal economy into the first regression to minimize mostly unidirectional influences of underreporting ($gdp_{c,t} = \alpha + vnl_{c,t} + informaleconomy_{c,t} + y_{c,t}$). This generates new groups of positive and negative residuals without the asymmetric influence of the informal economy. The majority of results stay robust to this alternation. Notably, decentralization and press freedom deviate the most. In particular, decentralization now also shows heterogeneous effect for over- and underreporting samples, while freedom of press becomes congruent and more informative. The results of these extended regressions are placed in the Appendix (Table A.1.8).

where $gdp_{c,t}$ is the logarithm of the official GDP measure for a country c in year t , $vnl_{c,t}$ is the logarithm of the economic activity measured by VIIRS night-time lights and $y_{c,t}$ is the error term, i.e., the variance of GDP not explained by night-time lights. The residuals $y_{c,t}$ measure the possible scale of manipulation of GDP data and are used as the dependent variable in the second step of the analysis. Figure 1 shows the results of the first regression.

Figure 1.1 Regressing GDP on Nightlights



Note: This figure shows the data points, regression line and 95%-confidence interval of the regression in equation (1).

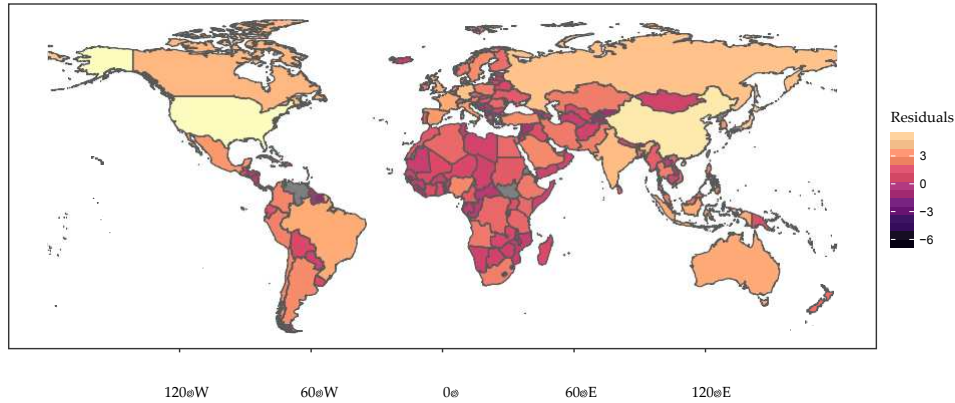
In the second step, the residuals from regression (1), i.e., the deviation of the official GDP from the predicted GDP by night-time lights, are regressed on the variables of interest. We estimate the following OLS regression:

$$y_{c,t} = \alpha + \beta_1 iso_{c,t} + \beta_2 po_{c,t} + \beta_3 eo_{c,t} + \beta_4 pf_{c,t} + \beta_5 dec_{c,t} + \mathbf{K}\gamma + \theta_t + \epsilon_{c,t} \quad (2)$$

Where $y_{c,t}$ is our aforementioned measure for possible data manipulation for country c for year t , and α is a constant. $iso_{c,t}$ measures the independence of the statistical office, $po_{c,t}$ measures the political openness of a country, $eo_{c,t}$ is a measure of the economic openness of a country, $pf_{c,t}$ measures freedom of the press, and $dec_{c,t}$ measures of the extent of decentralization in a country. $\mathbf{K}$ is a vector of control variables, further discussed below. Time-fixed effects θ_t are included to control for year-specific unobservables. $\epsilon_{c,t}$ represents the error term. We refrain from using country-fixed effects because the variation over these few years in our variables is minimal. As $y_{c,t}$ does not directly measure data manipulation, but only the possible scale of manipulation of GDP data, control variables $\mathbf{K}$ are included in the main regression. They capture other factors that may explain why a country's official GDP differs from the GDP measured by night light. The vector $\mathbf{K}$ includes the shares of different sectors contributing to GDP, a measure of the extent of the informal economy, and the degree of democracy.

The method of analyzing the residuals of official GDP from predicted GDP by night-time lights allows us to examine both over- and under-reporting of official GDP numbers. Positive residuals suggest over-reporting, whereas negative residuals suggest under-reporting of official GDP statistics³. We present results for subsets of countries with either possible over-reporting or under-reporting, respectively. Figure 2 shows the spatial distribution of the residuals.

Figure 1.2 Spatial Distribution of the Dependent Variable



Note: This figure shows the spatial distribution of the residuals for 2017, when regressing GDP on night-time lights, as in equation (1).

By using night-time lights, we have a clear advantage over other methods of detecting data manipulation. While Benford's law can best account for methods of manipulation where numbers are directly altered, night-time light analysis can account for other methods of manipulation. This includes those four methods of manipulation introduced by Aragão and Linsi (2022). For an analysis of more than one country, it is useful to have a comparable quantitative measure rather than surveys and interviews.

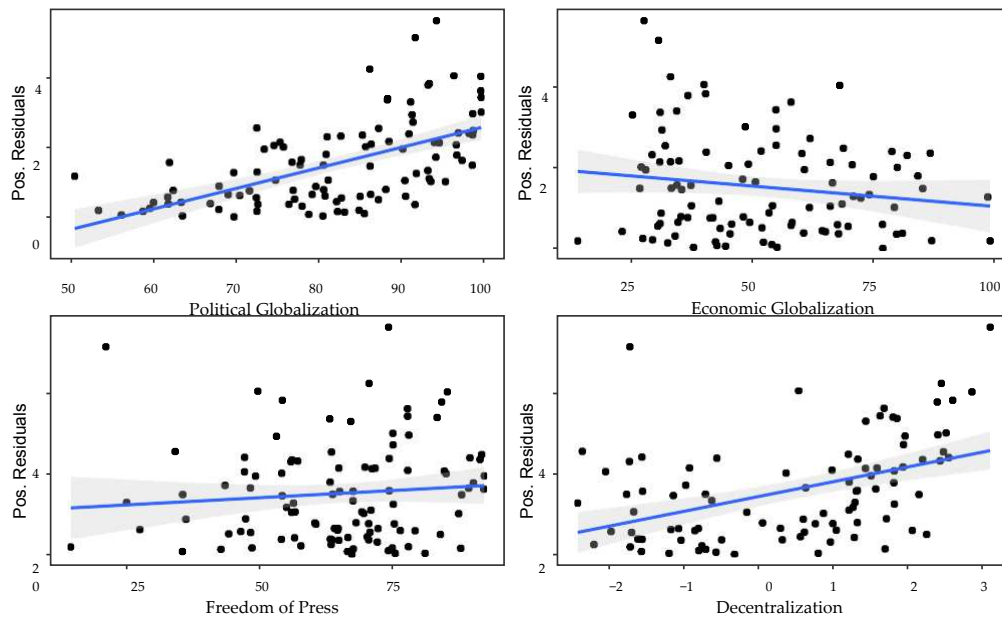
³ A critical aspect of our study's robustness is whether countries switch between these over and under-reporting categories over time. Such fluctuations could question the validity of our approach and results. Within the seven-year span of our study, there are 18 countries that switch between the categories, which would, at first glance, be indeed a concern. However, if we exclude the smallest residuals around 0 (-0.1 to 0.1 with a range from -3.5 to 3) only one unique switch is reported (Estonia). As such, our variation of this phenomenon constitutes, at most, a neglectable issue. This holds as well for the additional outcome measure of $\ln(\text{sum}/\text{area})$.

1.6 Results

1.2.6 Simple Correlations

We start by showing the results of simple bivariate regressions to display the relationship between our explanatory variables and the positive residuals from regressing official GDP data on night-time lights. These regressions are based on a cross-sectional subset of all countries in our data set for the year 2019. The correlation plots in Figure 1.3 show the results. The independence of the statistical office is excluded from this analysis, as data is solely available for African countries.

Figure 1.3 Correlation Plots for Over-Reporting of GDP



Note: This figure shows correlation plots for the results of regressing the positive residuals on each explanatory variable using a subset of the data for 2019.

The correlation plots show correlations in the expected direction for hypotheses 2 and 4. Higher economic openness is related to lower over-reporting, and powerful subnational units are associated with an increase in the deviation of official numbers from the genuine numbers. The first plot shows that political globalization is positively associated with possible over-reporting, which runs counter to hypothesis 1. Finally, the third plot shows no clear relationship between freedom of the press and a possible over-reporting of GDP statistics, where our hypothesis 3 would predict a negative association. These results are, however, purely correlational and are likely to be confounded by missing variables. To mitigate the undeniable influence of other mechanisms and omitted variables, which also might affect the deviation of official GDP statistics and predicted night-time light values, we include all explanatory variables simultaneously. In addition, control variables are accounted for in the following regression analysis.

1.2.7 Regression Analysis

Table 1.1 presents the results for possible *over-reporting* of official GDP statistics. Our analysis suggests that economic globalization has a negative impact on over-reporting, and decentralization has a positive impact on over-reporting, both as hypothesized. Interestingly, political globalization seems to be positively associated with over-reporting, running counter to the hypothesized direction. These results are based on a subset of countries with positive residuals from regression (1). Prior to the analysis, all variables were standardized for a more straightforward interpretation and comparison of the coefficients. Columns (1) and (2) present results for the full set of countries within this subset, whereas columns (3) and (4) include a variable about the independence of the statistical office, which is limited to African countries. We judge our estimates by a 95%-level of statistical significance if not indicated differently.

Column (1) shows results without year-fixed effects. Although the coefficient for freedom of press shows a negative association with over-reporting, the coefficient is not statistically significant. We can, thus, not reject the null hypothesis, which states that there is no effect. The coefficient for political globalization suggests a positive effect on over-reporting. On average, a one standard deviation increase in political globalization is associated with a 0.441 standard deviation increase in the deviation of "official" GDP from "real" GDP. Although we can reject the null hypothesis, the result runs counter to our hypothesis 1, suggesting a negative effect of political globalization on data manipulation. In contrast, economic globalization is significantly negatively related to over-reporting, which aligns with hypothesis 2. A one standard deviation increase in economic globalization suggests a decrease in over-reporting of 0.167 standard deviations. We can, thus, reject the null hypothesis in favor of our hypothesis. Further, decentralization is significantly and positively associated with over-reporting of GDP numbers, rejecting the null hypothesis in favor of hypothesis 4. A one standard deviation increase in decentralization suggests a 0.084 standard deviations increase in over-reporting. Finally, the level of democracy is negatively and statistically significantly associated with over-reporting,

confirming previous research (Martinez, 2022). Column (2) adds year-fixed effects. The coefficients only change marginally.

Column (3) introduces the variable independence of the statistical office, which limits the data to African countries. The coefficient of the freedom of press again is not significant, which also applies to the variable independence of the statistical office. All other variables are similar to before but change in magnitude. The association for political globalization is now smaller, suggesting that a one standard deviation increase in political globalization increases over-reporting only by 0.27-0.28 standard deviations in African countries. The coefficient for economic globalization is almost equal, whereas the coefficients for decentralization and democracy are slightly larger. This suggests that in Africa, decentralization has a larger negative effect, and democracy has a bigger positive effect on publishing proper data than is the case in the rest of the world.

Table 1.1 OLS Regressions for Positive Residuals (Overreporting)

	<i>Dependent variable:</i>			
	Residuals			
	(1)	(2)	(3)	(4)
Press Freedom	-0.014 (0.041)	-0.019 (0.042)	0.043 (0.093)	0.037 (0.099)
Ind. Stat. Office			0.038 (0.036)	0.035 (0.039)
Pol. Globalization	0.441 (0.055)	0.447 (0.056)	0.269 (0.093)	0.280 (0.098)
Econ. Globalization	-0.167 (0.021)	-0.167 (0.021)	-0.161 (0.047)	-0.173 (0.049)
Decentralization	0.084 (0.027)	0.084 (0.026)	0.110 (0.048)	0.105 (0.049)
Democracy	-0.166 (0.056)	-0.172 (0.056)	-0.195 (0.074)	-0.191 (0.079)
Year F.E.	No	Yes	No	Yes
Observations	397	397	110	110
R2	0.606	0.616	0.501	0.506
Adjusted R2	0.596	0.602	0.445	0.427

Notes: This table reports OLS estimates for countries with an "official" GDP higher than predicted GDP by night-time lights. The dependent variable is the residuals from regression (1). All variables have been standardized prior to analysis. Columns (1) and (2) use all countries; columns (3) and (4) use African countries. Robust standard errors in parentheses. Constant and control variables are included.

Controls: Including the control variables increases the explained variance substantially, while the significance of the main variables is not affected. Informal economy has a statistically significant but small divergence-reducing effect. Share of agriculture, industry, and services have a similar magnitude, but all point in the other direction.

Table 1.2 shows the results for possible *under-reporting* of GDP data. The dependent variable is converted into absolute values, meaning that a higher value of the dependent variable represents more under-reporting of GDP data, i.e., more possible manipulation. The results are similar to over-reporting, with the difference that political globalization is now negatively associated with under-reporting, as hypothesized. The table is constructed in the same way as Table 1.1. Columns (1) and (2) again do not show a significant association between freedom of press and the manipulation of statistics. The coefficient for political globalization points in the opposite direction now. It suggests that a one standard deviation increase in political globalization decreases under-reporting of GDP by 0.29 standard deviations, which is in line with our hypothesis 1. A possible interpretation of this result may be that stronger political globalization reduces the possibilities to underreport their GDP. In contrast, an isolated country does not face such pressure to appear poorer than they are. This outcome may be attributed to possible financial obligations of other countries when the country in question appears to be poorer than it really is. We acknowledge that this is just one possible explanation among many others and requires further investigation.

Similarly, economic globalization is negatively related to under-reporting but only on a 90% significance level. A one-standard deviation increase in economic globalization suggests a decrease of 0.06-0.07 standard deviations in GDP under-reporting. This suggested effect is much smaller than for countries over-reporting their GDP numbers. The results indicate a positive effect of decentralization on data manipulation. A one standard deviation increase in decentralization increases under-reporting of GDP by 0.14 standard deviations. A one-standard deviation increase in democracy suggests a decrease in under-reporting by 0.15 standard deviations.

Table 1.2 OLS Regressions for Negative Residuals (Underreporting)

	<i>Dependent variable:</i>			
	Residuals			
	(1)	(2)	(3)	(4)
Press Freedom	0.050 (0.059)	0.054 (0.060)	-0.120 (0.092)	-0.142 (0.086)
Ind. Stat. Office			-0.093 (0.058)	-0.113 (0.067)
Pol. Globalization	-0.285 (0.020)	-0.289 (0.020)	-0.568 (0.068)	-0.550 (0.098)
Econ. Globalization	-0.064 (0.034)	-0.069 (0.035)	-0.069 (0.065)	-0.050 (0.104)
Decentralization	0.143 (0.036)	0.144 (0.037)	0.126 (0.099)	0.145 (0.097)
Democracy	-0.147 (0.042)	-0.152 (0.045)	0.069 (0.090)	0.090 (0.092)
Year F.E.	No	Yes	No	Yes
Observations	124	124	51	51
R2	0.627	0.630	0.781	0.790
Adjusted R2	0.594	0.583	0.719	0.700

Notes: This table reports OLS estimates for countries with an "official" GDP lower than predicted GDP by night-time lights. The dependent variable is the residuals from regression (1). All variables have been standardized prior to analysis. Columns (1) and (2) use all countries; columns (3) and (4) use African countries. Robust standard errors are in parentheses. Constant and control variables are included in all calculations.

Controls: Including the control variables increases the explained variance substantially. Share of service indicates a small divergence increasing effect.

Focusing on African countries in columns (3) and (4), only political globalization seems to affect data manipulation. The coefficient suggests that a one standard deviation increase in political globalization decreases under-reporting of GDP by 0.55 standard deviations. For press freedom, independence of the statistical office, economic globalization, decentralization, and democracy, there are no significant associations when focusing on African countries.

1.7 Robustness Checks

As a robustness check for our outcome of interest, we alternate the measure of night light intensity. Since the mean value of night light intensity by country has some drawbacks, such as missing geographical influence, we extend our analysis to the natural logarithm of the sum of night light intensity by the country's area. Thus representing the proportionality of the night light intensity relative to its area. A compelling indicator for our findings would be the consistency of the coefficients' direction with previously computed mean night light values.

The results are presented in Table 1.3. The columns (1) and (2) show the results for the overreporting sample, while regressions (3) and (4) show the underreporting sample results. In comparison to Table 1, the coefficients' signs align in all cases. In the underreporting main sample, press freedom now becomes statistically significant, whereas all other variables align with the results of Table 1.2. For the subsample of African countries, only decentralization increases in magnitude.

Overall, the results hold within over- and under-reporting countries for the alternative outcome specification. Across the main subsample, we again observe some heterogeneity in effects. Political openness increases the divergence of GDP and nightlight in the overreporting countries, while it decreases it in the underreporting countries. Decentralization, across all specifications, indicates consistently more overreporting. Contrary, democracy suggests less manipulation in either direction. Economic openness is also consistently a reducing driver but doesn't hold its statistical significance in the subsample of African countries.

Table 1.3 OLS Regressions for Residuals 3 Sum/area

	<i>Dependent variable:</i>			
	Residuals			
	Pos. res (1)	Pos. res (2)	Neg. res (3)	Neg. res (4)
Press Freedom	-0.073 (0.090)	0.076 (0.172)	0.345 (0.110)	-0.010 (0.144)
Ind. Stat. Office		-0.101 (0.124)		-0.434 (0.111)
Pol. Globalization	1.330 (0.140)	0.934 (0.207)	-0.776 (0.054)	-1.530 (0.150)
Econ. Globalization	-0.297 (0.048)	-0.487 (0.128)	-0.106 (0.065)	0.023 (0.115)
Decentralization	0.396 (0.065)	0.578 (0.146)	0.194 (0.073)	0.398 (0.132)
Democracy	-0.460 (0.126)	-0.332 (0.147)	-0.280 (0.093)	0.142 (0.122)
Year F.E.	Yes	Yes	Yes	Yes
Observations	345	61	176	100
R2	0.676	0.825	0.545	0.692
Adjusted R2	0.662	0.766	0.505	0.637

Notes: This table reports OLS estimates for countries with an "official" GDP higher than predicted GDP by the sum of night-time lights over area in columns (1) and (2). Columns (3) and (4) present the results for underreporting countries. All variables have been standardized prior to analysis. Columns (1) and (3) use all countries; columns (2) and (4) use African countries. Robust standard errors in parentheses. Constant and control variables are included in all calculations.

Controls: Informal economy has a statistically significant but small divergence-reducing effect. The four sectors have small and heterogeneous effects for positive and negative residuals.

To improve our measure of political openness, we differentiate between international and internal political openness. While international treaties and memberships in international organizations probably influence the adaptation of official GDP statistics, the internal political openness of a country could also play a crucial role. The more open a political system is for citizens to participate in, the less divergence of night light and GDP is to be expected.

We employ the political rights score by the Freedom House, which is calculated based on the electoral process, political pluralism and participation, and the functioning of government. As a further proxy for international political openness, we exploit passport power. This variable reflects the number of countries citizens can travel to visa-free.

In Table 1.4, the variables passport power and political rights are included in all specifications. Here, we restrict the results to the main sample without the independent statistical office to enable a direct comparison of the two outcome measures. For mean night light intensity, even though passport power has a substantial magnitude, the other coefficients remain statistically significant and of similar magnitude. In the case of summed night light over area, also no variable changes its sign.

For the pooled sample of all residuals, including the political rights score does not affect the coefficients at all (see Appendix A.1.7). The largest change is found for the democracy variable, which decreases in its third decimal. We conclude that while internal political rights seem a plausible determinant for the divergence of GDP and night light intensity, we cannot find a relevant statistical link. For passport power, we find heterogeneous effects. In the overreporting samples, its explanatory role is stronger and statistically significant, while it does not play any role in the underreporting samples. This is consistent with the results of political openness and points in the direction of heterogeneous effects for over- and underreporting countries.

Table 1.4 OLS Regressions for Residuals 3 Passport Power & Political rights

	<i>Dependent variable:</i>			
	Residuals			
	Mean		Sum/area	
	Pos. res	Neg. res	Pos. res	Neg. res
	(1)	(2)	(3)	(4)
Press Freedom	-0.046 (0.043)	0.068 (0.062)	-0.209 (0.094)	0.358 (0.111)
Pol. Globalization	0.400 (0.057)	-0.292 (0.020)	1.180 (0.141)	-0.790 (0.056)
Econ. Globalization	-0.189 (0.022)	-0.073 (0.035)	-0.336 (0.047)	-0.119 (0.064)
Decentralization	0.068 (0.026)	0.126 (0.039)	0.290 (0.068)	0.185 (0.076)
Democracy	-0.154 (0.072)	-0.175 (0.081)	-0.562 (0.179)	-0.140 (0.137)
Passport Power	0.155 (0.037)	0.050 (0.048)	0.459 (0.086)	0.063 (0.118)
Political Rights	-0.051 (0.077)	0.010 (0.076)	0.066 (0.174)	-0.168 (0.127)
Year F.E.	Yes	Yes	Yes	Yes
Observations	397	124	345	176
R2	0.634	0.633	0.703	0.550
Adjusted R2	0.619	0.578	0.688	0.504

Notes: This table reports OLS estimates for countries with an "official" GDP higher than predicted GDP by night-time lights. The dependent variable is the residuals from regression (1). All variables have been standardized prior to analysis. Columns (1) and (2) use all countries; columns (3) and (4) use African countries. Robust standard errors in parentheses. Constant and control variables are included in all calculations.

Table 1.5 presents robustness checks of the results using alternative data quality measures. We employ ODIN and ODB for robustness checks. They are, however, no direct measures of data manipulation, but rather indicate overall data quality and accessibility of official data. A higher value in either one of these measures represents higher official data quality, which we interpret as making data manipulation less likely.

Columns (1) and (2) present the results for the ODIN score as a dependent variable, and columns (3) and (4) for the ODB as a dependent variable. The straight columns additionally include year-fixed effects. The regression coefficients read as follows: A one-point increase in the freedom of press index is associated with a 0.245 points decrease in the ODIN score. This result for press freedom contradicts our hypothesis 3 and is not in line with our main results. Political and economic globalization are significantly and positively associated with the ODIN score. This is partially in line with our main results. Decentralization is significantly and positively associated with the ODIN score, which is against our hypothesis 4 and our main results. Democracy is positively associated with the ODIN score.

Table 1.5 Robustness Checks

	<i>Dependent variable:</i>			
	ODIN		ODB	
	(1)	(2)	(3)	(4)
Press Freedom	-0.235 (0.092)	-0.235 (0.096)	0.101 (0.086)	0.101 (0.085)
Pol. Globalization	0.550 (0.089)	0.522 (0.089)	0.714 (0.091)	0.717 (0.092)
Econ. Globalization	0.271 (0.053)	0.237 (0.050)	0.094 (0.049)	0.089 (0.049)
Decentralization	0.190 (0.069)	0.163 (0.065)	0.182 (0.058)	0.178 (0.058)
Democracy	0.390 (0.109)	0.377 (0.107)	0.240 (0.099)	0.243 (0.098)
Year F.E.	No	Yes	No	Yes
Observations	215	215	201	201
R ²	0.495	0.557	0.594	0.603
Adjusted R ²	0.482	0.544	0.583	0.588

Notes: This table reports OLS estimates for robustness using the ODIN (columns 1 and 2) and the ODB (columns 3 and 4) as a dependent variable. All variables have been standardized prior to analysis. Robust standard errors in parentheses. Constant included but not reported.

The results for the ODB are similar, freedom of press is, however, not significantly associated with the ODB. This is in line with our main results.

1.8 Discussion

Building on political economic theory, we establish five hypotheses, which aim to explain why some governments more often manipulate official data than others. Specifically, we hypothesize that a country's openness, freedom of press, and independence of the statistical office decrease, and decentralization increases a country's incentives for manipulating official data. To test these hypotheses, we use night-time lighting captured by satellites to predict the economic output. We explain the deviation of "official" GDP from "true" GDP, predicted by night-time lights, with variables based on our hypotheses. The analysis is bolstered by an alternative outcome measure controlling for geography and including further measures to differentiate political openness. Our paper seeks to contribute to a better theoretical

and empirical understanding of governments' data falsification.

The emphasis lies on the comparison across the over- and underreporting samples. We observe that the majority of countries fall into the overreporting category and generally have a higher explained variance. With the larger explanatory relevance of coefficients, it implies more evidence in the overreporting countries. Considering the alternative outcome measure, we find great consistency within and across over- and underreporting countries. Noteworthy is the press freedom's change in magnitude and significance, which requires a more fine-grained analysis in order to provide a satisfactory interpretation.

Following, we contextualize the overall findings for each variable. They are discussed in order of the magnitude of their effect size and therefore, their explanatory relevance.

For the *political openness* variable, we find heterogeneous effects. While for countries over-reporting GDP, our results suggest that political openness increases manipulation, for countries under-reporting GDP, our results suggest the opposite. The former result might be explainable because many decisions in international organizations are based on rankings or evaluations (Kelley and Simmons 2021), so that member-countries have incentives to over-report GDP or statistics in order to improve reputation and lower credit risk. The latter result is in line with our hypothesis. A reason might be that a country politically more exposed to other nations finds it more difficult to under-report its GDP because the other nations may fear they have to financially support the country. The stronger the political integration with other countries, the more critical these countries are when a lower GDP than plausible is officially reported. A similar heterogeneity occurs for the alternative measure of international political openness, *passport power*. Its explanatory role is stronger and statistically significant in the overreporting samples, while it does not play any role in the underreporting samples. This is consistent with the results of political openness and points in the direction of heterogeneous effects for over- and underreporting countries. For our measure of internal political openness, *political rights*, the results are inconclusive, of low magnitude, and no statistical significance.

Economic globalization tends to consistently reduce data falsification by the government. Economic integration makes it easier to reproduce data and increases information exchange between countries, both making it less likely that official data is manipulated (Kubo, 2012; Yang & Shanahan, 2003).

The empirical estimates for the control variable of *democracy* confirm that more democratic regimes tend to manipulate GDP to a lesser extent, as established by Martinez (2022) or Magee and Doces (2015). This serves as a sanity check for our main results.

As hypothesized, *decentralization* increases the government's scope to present manipulated official statistics. Decentralization increases the scope for subnational entities to manipulate data. This outcome may also be attributable to missing

standards, resulting in aggregation errors. Our results that decentralization increases manipulation are in line with Koen and Van den Noord (2005). However, it remains to be explored which specific decentralized competencies drive these results and whether, for instance, accountability can mitigate it.

Surprisingly, we do not find any significant association between *press freedom* and the extent of falsification of official data. This empirical finding goes against the hypothesized notion that a freer press allows for easier detection and publication of governments' efforts to manipulate data. Four plausible reasons can explain this result. First, the press simply has no effect in restraining a government's effort to manipulate data. To contest the official statistics, the press would need plausible/sensible alternative data, which it might be unable to obtain. Second, the data on press freedom may not be suited to capture the reporting on data manipulation, but be better suited for more narrow political issues. Third, the estimation approach applied does not sufficiently capture the relationship between the activity of the press and how official data is produced. Fourth, the hypothesis insufficiently considers a possibly dwindling importance of the press relative to social media. An increasing number of young people rely much more on discussions in blogs and other digital channels than on newspapers (Geers, 2020). In contexts characterized by limited freedom of press, the consumption of online news, including (global) social media, is an important factor in enabling political participation (Karakaya & Glazier, 2019). Foreign newspapers might also have a substantial impact. Though they do not influence the local freedom of press index, they still play a role in unveiling local government data manipulation.

Our findings provide limited support for the World Bank's (2021) report that an independent statistical office can mitigate data manipulation. While the statistical significance of our results is modest, the direction of the coefficients in the underreporting sample consistently indicates a trend toward reducing deviations, aligning with our hypothesis. Importantly, this result relates only to the subsample of African countries, and no statistical link was found in the overreporting sample. While in Africa, other determinants might be more important in explaining data manipulation, the independence of the statistical office may well be able to reduce governments' incentives to manipulate data in a non-African context.

Our study is subject to various limitations and should provide a first inquiry into new hypotheses in the study of government data manipulation. The OLS estimations are not able to capture causal effects. The most common caveats to establishing causality are briefly discussed in the following. In addition, our explanatory variables partly also rely on officially reported statistics. Those are, however, much more detailed and harder to manipulate to be in accordance with the respective GDP manipulation. Most of the variables are indices and comprise different sorts of information, making a systematic bias less likely (though not unlikely). Reverse or simultaneous causality might be a problem in our empirical design. If official data has been manipulated, a government has an incentive to curtail press freedom further. Rampant data manipulation could also lead to other countries

cutting ties with the manipulating country or being excluded from international organizations. This would decrease political globalization and, to a lesser extent, possibly also economic globalization of a country. For the variables of the independence of the statistical office and decentralization, it seems unlikely that data manipulation has a direct short-term impact on them. Finally, omitted variables might bias our estimations.

1.9 Conclusion

This paper analyzes the manipulation of official data and how different institutional arrangements might affect the extent of this manipulation. While this topic has been mainly taken up by the popular press, academic research has not substantially analyzed the various institutional factors beyond democracy and autocracy that increase or decrease the incentives for data manipulation. This is arguably due to the difficulty of determining the true state of an economy. Various approaches have been employed to cope with this phenomenon. They rely on corrections made by international organizations such as the WTO, which are more trustworthy than the nationally reported data. Kerner et al. (2017) provide evidence for low-income countries, concluding that in contrast to initial GDP statistics, ex-post revised statistics reflect stronger data management practices. Data manipulation biases econometric results of, e.g., policy evaluations. Thus, at least some national policymakers and international organizations are wrongly informed about the state of the economy.

We hypothesize that a country's economic and political openness, an independent statistical office, and press freedom curb the falsification of official data. In contrast, decentralization is expected to increase the government's scope for data manipulation. We test the hypothesized associations by constructing a panel data set consisting of 195 countries from 2013 to 2019. Night-time lighting data is employed to predict "real" GDP. Subsequently, the deviations from predicted to "official" GDP are split into over- and under-reporting country samples. Those deviations are explained with determinants suggested by our theoretical hypotheses. In addition, we employ a further outcome measure sum/area and also include the variable informal economy in the first stage regression to minimize the mostly unidirectional influences of underreporting (Table A1.8). Nightlight data is a good proxy for measuring "real" economic activity (e.g., Henderson et al., 2012), and is very unlikely to be manipulated by governments. If this measure becomes more prominent, however, governments might try to alter lighting in their countries.

Summarizing our main insights, the study reveals that economic openness and democracy generally reduce data manipulation. Decentralization increases it for the overreporting sample and having no robust effect in underreporting countries. Political openness shows heterogeneous effects for over- or underreporting samples; it increases manipulation in overreporting countries but decreases it in underreporting ones. This aligns with the results of passport power, which arguably is a comparable measure of international relations. Against our expectations, the

effect of press freedom turns out to be unclear. Taking the informal economy into account in the first stage regression, the results of press freedom align with Table 4. A decreasing manipulation effect for overreporting countries and an increasing effect for underreporting countries is observed. These results are robust to an alternative outcome measure and to further control variables such as the internal political openness measuring political rights. However, the specific mechanisms remain to be explored in detail.

Falsification of statistics is not limited to governments. Also in the private sector, the manipulation of data is prevalent for instance, in the form of falsified credit ratings (e.g., Nguyen et al., 2023) or online reviews (e.g., Mayzlin et al., 2014; Zheng et al., 2021). Forthcoming studies should also include institutions altering the incentives for data manipulation in the private sector. Future research should try to establish a causal relationship between different types of institutions and data manipulation. This relation may also behave differently for different sets of countries and economic systems. With the emergence of more precise estimating procedures of economic activity, for example, by using daytime instead of night-time satellite imagery (see e.g., Lehnert et al., 2023), the detection of manipulated GDP should become easier and more accurate. Moreover, the benefit of this independent data collection by satellites offers the potential for correction mechanisms of national statistics but requires some level of international cooperation. Another challenging aspect is to inquire about the role of social media in constraining data manipulation and if it indeed replaces the press in its role of disciplining the government.

Overall, this paper sheds light on the critical role that institutions play in ensuring the accuracy and reliability of official statistics. Our conclusion: Institutions matter and will also be required to further leverage the potential of nightlight data in the future.

Appendix Chapter 1.

Table A.1.6 Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Max
GDP (in bln)	1,312	420.618	1,730.881	0.087	21,433.225
Nighttime Lights Mean	1,357	1.706	6.378	0.00001	64.399
Freedom of Press	1,033	65.522	16.411	11.130	93.540
Decentralization	952	0.249	1.441	2.506	3.108
Ind. Stat. Office	378	33.003	26.770	0.000	100.000
Pol. Globalization	1,294	72.179	18.893	14.972	99.693
Econ. Globalization	1,259	56.126	18.403	11.771	99.203
Democracy	1,203	0.529	0.255	0.016	0.923
Informal Economy	888	28.962	11.301	8.000	64.600
Share Agriculture	1,262	10.937	10.614	0.014	60.611
Share Manufacturing	1,207	11.852	6.381	0.000	38.733
Share Industry	1,267	25.886	11.283	4.556	73.099
Share Services	1,263	55.263	11.466	16.775	94.256

Table A.1.7 Pooled Residuals

	<i>Dependent variable:</i>			
	Residuals			
	Mean		Sum/area	
Press Freedom	-0.039 (0.042)	-0.140 (0.099)	-0.409 (0.081)	-0.080 (0.184)
Ind. Stat. Office		0.022 (0.039)		0.356 (0.099)
Pol. Globalization	0.067 (0.041)	-0.042 (0.098)	1.589 (0.077)	1.819 (0.134)
Econ. Globalization	-0.158 (0.021)	-0.143 (0.049)	-0.182 (0.046)	-0.263 (0.109)
Decentralization	0.124 (0.026)	0.183 (0.049)	0.374 (0.055)	0.268 (0.124)
Democracy	-0.121 (0.045)	-0.087 (0.079)	-0.177 (0.104)	-0.394 (0.153)
Year F.E.	Yes	Yes	Yes	Yes
Observations	521	161	521	161
R2	0.504	0.415	0.805	0.722
Adjusted R2	0.490	0.354	0.800	0.693

Notes: This table reports OLS estimates using the pooled residuals as a dependent variable (non-absolute values). All variables have been standardized prior to analysis. Robust standard errors in parentheses. Constant and controls are included but not reported.

Table A.1.8 Residuals, controlled for informal economy

	<i>Dependent variable:</i>					
	Residuals					
	Pos. res (1)	Mean Neg. res (2)	Pooled (3)	Pos. res (4)	Sum/area Neg. res (5)	Pooled (6)
Press Freedom	-0.097 (0.063)	0.062 (0.049)	-0.092 (0.050)	-0.319 (0.113)	0.305 (0.112)	-0.345 (0.098)
Pol. Globalization	0.323 (0.062)	-0.493 (0.042)	-0.149 (0.051)	0.612 (0.140)	-0.919 (0.078)	1.485 (0.072)
Econ. Globalization	-0.194 (0.027)	0.050 (0.039)	-0.156 (0.026)	-0.103* (0.045)	-0.106 (0.064)	-0.218 (0.056)
Decentralization	0.153 (0.037)	0.025 (0.039)	0.173 (0.033)	0.323 (0.084)	0.043 (0.066)	0.245 (0.067)
Democracy	-0.188 (0.076)	-0.108 (0.065)	-0.153 (0.061)	-0.331 (0.154)	-0.018 (0.109)	-0.264 (0.126)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	351	170	521	334	187	521
R2	0.430	0.587	0.278	0.256	0.478	0.596
Adjusted R2	0.408	0.553	0.260	0.225	0.439	0.586

Notes: This table reports OLS estimates for both outcome measures. The dependent variable is the residuals from the regression including informal economy. All variables have been standardized prior to analysis. Columns (1), (2), and (3) use the mean night light intensity; columns (4), (5), and (6) use the sum/area night light intensity. Robust standard errors in parentheses. Constant and control variables are included in all calculations.

Noteworthy deviations from the initial regressions (without informal economy in the first stage regression) are marked with a grey background color.

Chapter 2. The Impact of Municipality Mergers on Political Participation*

Abstract

The citizen assembly of the Swiss canton Glarus in 2006 decided to radically reduce the historical number of communes from 25 to three. Scholars have shown that the financial and economic consequences of municipality mergers are surprisingly small. This chapter analyzes the effects of such a radical institutional change on citizens' vote participation as an indicator of their political involvement. Using the difference-in-difference and the synthetic control methods, we empirically show that vote participation dropped significantly, also compared to neighboring cantons and the rest of Switzerland. Thus, posing a trade-off between administrative efficiency and political participation.

2.1 A Radical Change

Constitutions 3 or rules of the game (Buchanan, 1954; Buchanan & Tullock, 1962; Brennan & Buchanan, 1980, 1985) 3 are productive if economic actors can depend on them when making decisions. This means that the rules have to be stable and not dominated by haphazard changes that actors cannot consider when thinking and deciding about the future. This applies to all parts of the polity (Mueller, 2003; Kurrild-Klitgaard, 2019), including the individual political actor deciding whether to engage in political participation in the case of a commune merger (Riker & Ordeshook, 1968; Persson & Tabellini, 2003; Koch & Rochat, 2017).

In contrast to the historical stability of the Swiss local government structure, the past decades have shown a strong tendency toward commune mergers (Hofmann & Rother, 2019). The number of communes dropped from 2,899 in the year 2000 to 2,202 communes in 2020, ranging in population size from the city of Zurich with 415,000 to Corippo with 11 inhabitants.

Until recently, the canton Glarus was composed of 25 independent communes, each with sovereignty over tax rates and public expenditures. The cantonal government

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had plans to somewhat reduce the number of communes to 14, or ten at best. Proponents of a reduction argued that the historical communes were often too small for efficient public services provision. Moreover, the communal boundaries would often not coincide with the benefits of public goods, i.e., substantial spillover effects occur. The envisaged reduction in the number of communes would primarily serve to exploit economies of scale and bring the supply of government services closer to demand (Lago-Peñas & Martinez-Vazquez, 2013).

In 2006, the Glarus Landsgemeinde made a sensational decision to change the constitution. Instead of the historic 25 local communes, the number was drastically reduced to merely three, i.e., by 88%. This decision was confirmed at the extraordinary Landsgemeinde of November 25, 2007: Since January 1, 2011, the canton of Glarus consists of the communes <Glarus Nord=, <Glarus=, and <Glarus Süd=. This direct democratic decision is remarkable insofar as the electorate took the decision even against the declared wish of the cantonal government.

We exploit the decision by the Landsgemeinde as a quasi-natural experiment, allowing us to study the effects of a generally unexpected, significant, and self-chosen commune merger. These effects may occur with respect to narrowly economic aspects (in particular tax receipts, public expenditures, and public debt) as well as to broader political aspects, most importantly, possible changes in the democratic relationship of citizens to their government. This relationship is strongly characterized by the right and responsibility of voting. An adversely affected relationship can arguably be reflected in a decline in vote participation (Putnam, 2000; Kim, 2005). Citizens of Switzerland have a voting right on each of the three federal levels: the central state, the cantons, and communes.⁴ The main reasoning behind the merger was based on economic efficiency, professionalism of local politics, and potential economies of scale (Bhatti & Hansen, 2019). Thus, it can be taken to be exogenous to the democratic process and the extent of vote participation in Glarus.

Our study focuses on the effect on democratic decision-making in the form of vote participation rather than on economic effects, which have already been analyzed in the literature. We argue that a radical municipality merger negatively affects the political participation of the municipality's population on the national level. Specifically, we expect the share of non-voters to increase. The presumed mechanisms responsible include the abrupt structural changes in size, restructured local bureaucracies, and distorted information flows. In addition, the regional and emotional identification of the population with the new boundaries distorts participation in the political decision-making process (Brubaker & Cooper, 2000). The commune merger contributed to the perception of local politics in such a way that residents increasingly see themselves as consumers or passive actors of politics in general (Andrew & Goldsmith, 1998; Strebel, 2018). This effect corresponds to an increase in professionalization of the three new communes in Glarus. We argue that the radical commune merger intensifies these

⁴ The political economy of decentralization has e.g., been analyzed by Matsusaka, 1995, 2005; Feld & Kirchgässner, 2000; Besley & Coate, 2003; Feld & Matsusaka, 2003; Benz & Stutzer, 2007; Feld et al., 2008; Funk & Gathman, 2013; Galetta, 2020.

aspects and hampers the democratic relationship of citizens with their government. By negatively altering the individuals' incentives for political participation, the affected relationship is reflected by the change in vote participation on a national level and at the Landsgemeinde.

To empirically identify the effect of the radical merger on democratic decision-making on the national level, the vote participation from 1991 to 2019 is analyzed in Glarus and compared to its neighboring cantons and Switzerland as a whole. In addition to the difference-in-difference analysis, we apply the synthetic control method to obtain robust and reliable results. Due to the time lag of three years between the decision taken to merge communes and the actual implementation, we analyze both effects on vote participation. We find that citizens' relationship to democratic politics has suffered from the decision and implementation effect. A cursory examination hints at a falling, rather than rising, long-term vote participation rate at the Landsgemeinde.

The next section surveys the existing literature on commune mergers in Switzerland. The subsequent section analyzes the democratic effects of reducing the number of lower-level political bodies and formulates the empirically testable hypothesis. We then present the descriptive and econometric analyses, before discussing the results and concluding.

2.2 Mergers of Communes in Switzerland

The consequences of commune mergers concerning public administration expenditures have been investigated in various affected countries. Related studies targeting Switzerland include Lüchinger and Stutzer (2002), who investigate the abolition of communes in the canton of Solothurn, showing that it resulted in higher public spending. Steiner and Kaiser (2017) examine 35 mergers of communes in Switzerland between 2001 and 2014 and find no impact on local finances. In Switzerland, Studerus et al. (2020) find no clear effects on government spending and public debt. Only administrative spending has declined slightly.

One analysis (Hofmann & Rother, 2019) using the synthetic control method deals with the large reduction in the number of communes in the canton of Glarus coming into force in 2011. In some specific areas, the authors can identify small savings. However, these savings are largely due to the reorganization between the canton and the communes that accompanied the reduction in the number of communes. Therefore, they would have been possible even without this massive intervention. These studies suggest that, overall, the benefits of increasing the size of communes are small in economic terms and even frequently inexistent (Rösel, 2017). Thus, they can hardly serve as a weighty argument for mergers of communes.

2.3 Communal Mergers and Democratic Participation

The literature on political participation in democracies is vast and by now the term includes not only voting or demonstrating, but also volunteering or even <guerrilla gardening> (van Deth, 2021). The focus on voting, party membership, and campaigning in the 1950s was extended by the role of connections between politicians and citizens in the 1960s (Berelson et al., 1986). Gradually, other forms of political participation were recognized in the scholarly literature. By now, almost any activity that affects politics is defined as political participation (van Deth, 2021). Taking this into account, we knowingly narrow our analysis down to vote participation at the national level as one form of political participation playing a vital role in direct democracies.

The existing literature leaves open whether the emotional attachment of the population to the political process is affected as a result of the abolition of historically grown communes. However, Silberstein and Soguel (2012) suggest that a merger disrupts the local place attachment by altering fundamental aspects of individuals' identification with the commune. In contrast to our line of arguments, Rühli (2012) argues that mergers facilitate political participation and increase the attractiveness of local public office. The main driver of this predicted outcome are the higher stakes of local politics.

However, the scholarly literature indicates that vote turnout, as a proxy for political participation, decreases on a local level with municipal mergers (Fritz & Feld, 2015; Koch & Rochat, 2017). Bhatti and Hansen (2019) approach this relationship in a Danish setting. They find no robust long-term effect but emphasize the negative effects on vote turnout for the municipalities with the most complex changes. Hansen (2014) reports a lower satisfaction with local democracy and local administration following a commune merger in Denmark. In addition, trust in political decision-makers declines in the newly formed communes (Hansen, 2013). Another democratic cost of municipal mergers in Denmark is shown by Lassen and Serritzlew (2011). The authors show a decline in internal political efficacy and argue that it is closely linked with political participation. These developments are likely to be reflected in citizens' general political participation, including vote turnout.

The democratic relationship of the local population regarding local democracy can be hampered by various factors (Geys, 2006). The link between municipal mergers and local democracy interact as has been discussed for the Swiss case by Bühlmann (2006) and Ladner and Bühlmann (2007). For instance, internal political efficacy is one identified aspect that decreases with jurisdiction size and arguably voting behavior (Lassen & Serritzlew, 2011). While some studies find a negative relationship between commune size and vote turnout (Milner & Ladner, 2006; Ladner & Bühlmann, 2007), causality is still not fully established. For instance, population size per se does not include the character of social relations or other social dynamics which influence political participation. In contrast to established approaches on a local level, we investigate the effect of a radical communal merger on vote turnout at a higher level, the national elections (where political participation rates are precisely measured).

Zimmerbauer and Paasi (2013) emphasize the symbolic meaning of municipalities in the form of ingrained cognitive and emotional identities. Thus, not only rational arguments but also emotional reasoning is likely to influence the perception towards the overall political system and might spill over to a national level. Thus, political participation on a national level is mediated by political inclusion on a local level. However, empirically, the discrepancy in political participation at different levels of government is reflected in a substantial variety of vote turnouts (Morlan, 1984; Andersen et al., 2014).

To examine these relationships, we study citizens' vote participation before and after the merging of communes in the canton of Glarus. This is a well-suited proxy for how close the voters' relationship is to the type of democracy existing in Switzerland. Extensive literature (Pateman, 1970; Barber, 2003) argues that the higher vote participation is, the better democracy functions. The citizens are assumed to be more closely attached to democratic decisions made by their governments.

Evidently, the determinants influencing political participation are numerous and not restricted to mergers of communes and their consequences (for a review, see Merlo, 2006; Geys, 2006). For instance, the democratic relationship and, specifically, voting behavior are influenced by personal characteristics and the contextual setting (Bühlmann & Freitag, 2006). Educational attainment has also been shown to shape political participation (Galston, 2001). Blesse and Rösel (2017) conclude their review stating that smaller communes offer more opportunities for citizens to participate in politics.

While we focus on vote participation and hence politico-institutional change in Glarus, we control for economic and socio-demographic developments of the cantons (income per capita, unemployment rate, extent of industrialization, and education expenditure per capita). These controls are chosen based on the scholarly literature and their relationship to important determinants of political participation.

We derive the hypothesis based on the presumed effects of commune mergers on political participation. Due to abrupt structural changes in size, restructured local bureaucracies, and distorted information flows, participation in the political decision-making process is affected. In addition, the regional and emotional identification of the population changes with the new boundaries (Brubaker & Cooper, 2000). With increased professionalization, residents increasingly see themselves as consumers or passive actors of politics in general. We argue that the radical commune merger intensifies these aspects and hampers the democratic relationship of citizens with their government. By negatively affecting individuals' incentives for political participation, the relationship is reflected in a decline in vote participation on the national level.

We empirically test the following theoretical hypothesis: *The drastic reduction in the number of communes in the canton Glarus hampers the democratic relationship of the voters to the political system.*

The hypothesis covers two aspects: The <decision effect>, where the electorate in the Landsgemeinde decided about the reduction in the number of communes, and the <implementation effect> undertaken by the government of Glarus three years later.

2.4 Empirical Analyses of the Political Effects of the Community Mergers

2.4.1 Analysis using Descriptive Data

Vote participation is a crucial indicator of the quality of participatory democracy, such as in the canton of Glarus or Switzerland as a whole. The extent of political participation is a crucial source of legitimacy. Beyond its role for individuals taking part in public decisions, the extent of political participation provides value to the citizens in addition to the pure voting rights. It is a value as such. It raises individuals' self-confidence and is an important measure of social integration (Buchanan, 1956; Milbrath, 1981). In contrast, a low vote participation rate may result in producing decisions not representative of the electorate as a whole and may threaten the stability of the political unit (Pateman, 1970; Barber, 2003).

The communal merger in Glarus was decided in mid-2006, confirmed at the end of 2007, and implemented as of January 1, 2011. The decision in 2006 was not taken to be definitive, and therefore, we take the shock occurring at the beginning of 2008 as the <decision effect>. The shock at the beginning of 2011, when the merger was put into reality, reveals the <implementation effect>. We first consider the participation of citizens in anonymous ballots in polling stations or by mail and then shortly consider the participation in the meetings of the *Landsgemeinde*.

2.4.2 Participation in Federal Ballots

The propositions, referenda, and initiatives referring to decisions at the federal level in the canton Glarus are taken at the ballot box either by visiting the polling stations or by mail. Consequently, the participation rate can be precisely measured.

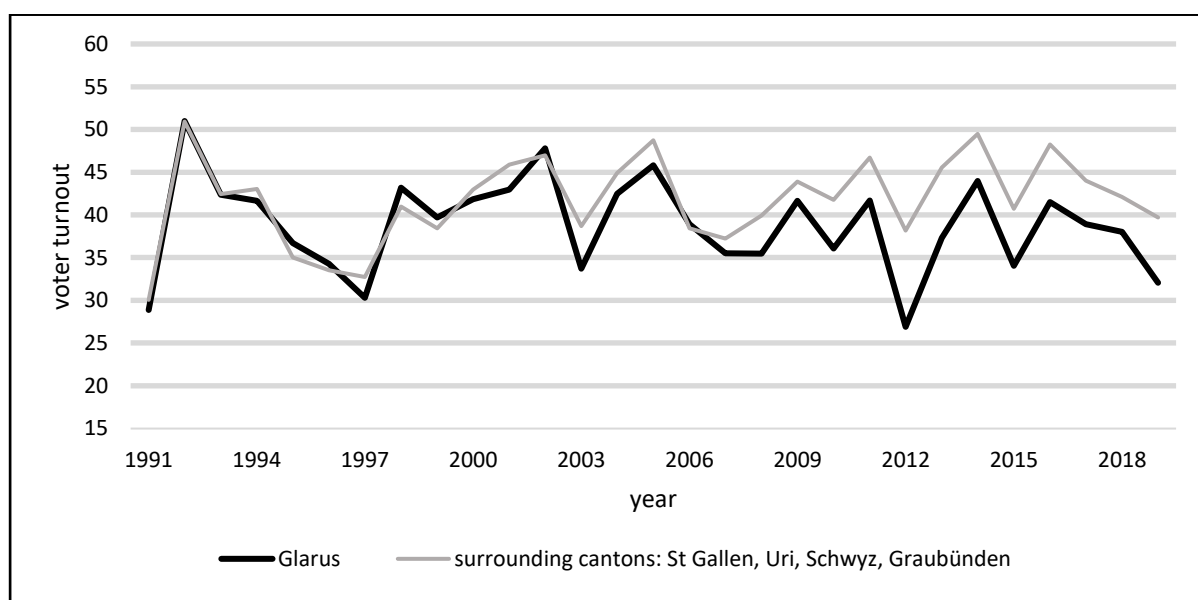
The long-term (1971-2007) voter turnout in federal votes of the citizens of Glarus before the drastic communal merger was 41.1%. Starting from 2008, vote participation in federal elections dropped to 37.3%, a decrease of 3.8 percentage points. A similar reduction in the vote participation of the citizens of Glarus can be observed when using 2011 as the shock year (3.7 percentage points). The decline suggests a less intensive relationship between the electorate and politics, which may partly be attributed to changed mental models (Shughart et al., 2020). This result is in line with the fears raised by opponents of the massive reduction in the number of communes from 25 to three.

It might be argued that voter turnout also fell in Switzerland (excluding Glarus) during these periods. However, the statistics show a different picture. Voter turnout was 43.2% in the years 1971-2007 and rose thereafter (2008-2019) to 45.9%. The increase amounts to 2.7 percentage points. The difference in the difference is 6.5 percentage points to the disadvantage of the canton of Glarus. Similar results can be deduced when looking at the voter turnout in the rest of Switzerland in the years 1971-2010 (43.4%) and 2011-2019 (46.1%). The increase amounts to 2.7 percentage points, and the difference in difference is 6.4 percentage points to the disadvantage of Glarus. These results are consistent with our hypothesis.

However, this comparison is somewhat questionable because the demographic and economic composition in the canton of Glarus is quite different from that of Switzerland as a whole. To take this aspect into account, we also compare voter turnout in the canton of Glarus with that in the surrounding cantons of St. Gallen, Uri, Schwyz, and Graubünden. In these cantons, voter turnout in federal referenda increased from 41.2% (1971-2007) to 43.4% (2008-2019), i.e. by 2.2 percentage points. The difference in the change is thus 6 percentage points to the disadvantage of Glarus. When comparing voter turnout in the neighboring cantons St. Gallen, Uri, Schwyz, and Graubünden before (1971-2010) and after the implementation, the difference in the vote participation amounts to 2.7 percentage points. The difference in difference is 6.4 percentage points to the disadvantage of Glarus.

Figure 2.1 shows that before the drastic change in the number of communes, the rate of vote participation was very similar to the surrounding cantons. However, beginning in 2008, the year after which the merger decision was confirmed, the vote participation in Glarus fell and did not recover over time. This result is inconsistent with the idea that citizens would adjust to the situation of a smaller number of communes over time. However, this insight is only valid for a restricted period until 2019. It cannot be excluded that in the future, this readjustment will take place.

Figure 2.1 Development of voter turnout in Glarus and surrounding cantons before and after the decision to reduce the number of local communes from 25 to three was confirmed.



Data source: Federal Statistical Office, 2022.

We now compare the vote participation in the previous 25 communes before their mergers to the three larger new communes. Unfortunately, there are little data for the vote participation of citizens in federal referenda in the 25 communes existing before the confirmation in 2007 and the implementation in 2011, compared to the three new

communes <Glarus Nord=, <Glarus=, and <Glarus Süd=. There are only data for vote participation in the 25 independent communes over the pre-merger period starting in 2004.

Table 2.1 shows the decision effect indicating the differences between the vote participation in the original 25 communes before (2004-2007) and after (2008-2019) the decision to merge was confirmed. In addition, the table reveals the turnout before (2004-2010) and after (2011-2019) the merger came into force (implementation effect).

Table 2.1 Decision and implementation effects at the level of communes

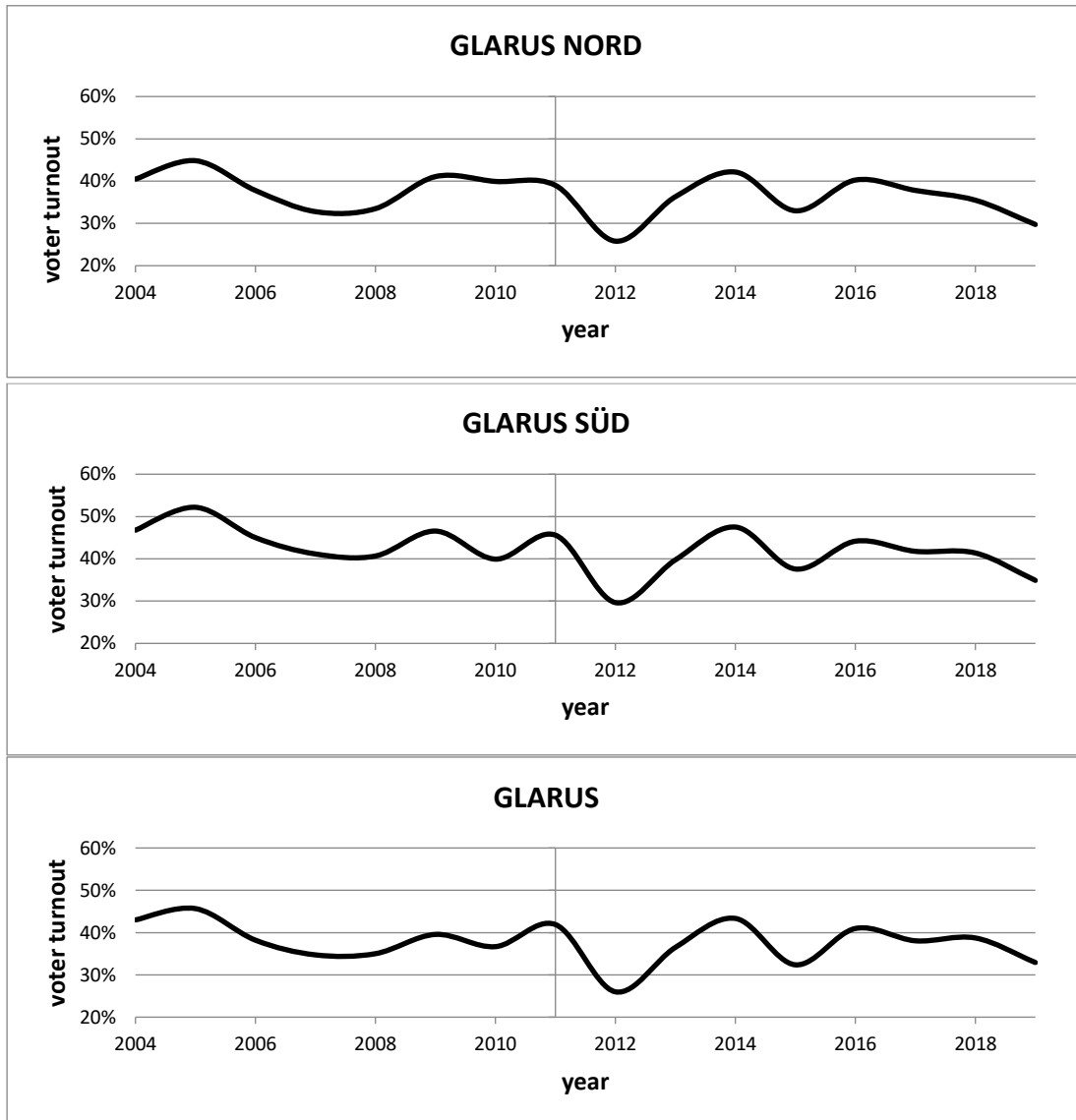
	GLARUS NORD	GLARUS	GLARUS SÜD
Average 2004-2007	39.0%	40.4%	46.3%
Average 2008-2019	36.2%	36.8%	40.8%
Difference	-2.8%	-3.6%	-5.5%
Average 2004-2010	38.6%	39.0%	44.6%
Average 2011-2019	35.5%	36.8%	40.3%
Difference	-3.1%	-2.2%	-4.3%

Data source: Canton Glarus, 2022.

Table 2.1 shows that the vote participation in the newly formed three communes was lower compared to the average in the original 25 communes of which they are composed. The percentage point differences are sizeable. Vote participation fell by 2.2 percentage points in the new commune Glarus, by 3.1 percentage points in Glarus Nord, and by 4.3 percentage points in Glarus Süd. The corresponding negative implementation effect amounts to 3.6 percentage points in the new commune Glarus, 2.8 percentage points in Glarus Nord, and 5.5 percentage points in Glarus Süd.

Figure 2.2 shows the development of the difference in aggregate vote participation in the 25 communes that later merged and the three new communes before and after the merger was implemented in 2011.

Figure 2.2 Difference in vote participation in federal referenda and elections before and after the merger in 2011.



Data Source: Canton Glarus, 2022.

As can be seen from Figure 2.2, the difference in citizens' political participation is quite variable, reflecting the importance attributed to the issues to be decided on. There is a marked decline in all three new communes after their establishment in 2011. Unsurprisingly, the citizens had to adjust to the new situation. However, the decline also suggests that the citizens of Glarus were not exceedingly happy to be part of one of the three much larger communes. Some citizens may also regret that their historical communes no longer exist, and their emotional attachment to the polity was diminished. They reacted by abstaining from casting their vote; it could even be considered a way of silent political protest. Up to 2014, the difference strongly recovered in all three new

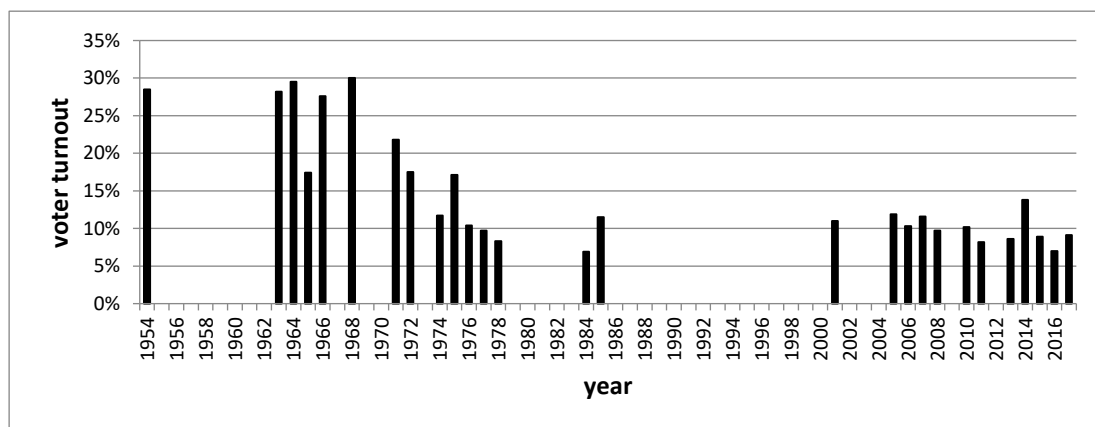
communes. But thereafter, there was a steady downfall in vote participation compared to the period before the merger in 2011.

2.4.3 Participation in the Landsgemeinde

Another indicator of the relationship of citizens to the political system is the attendance at the meetings of the Landsgemeinde, where decisions on cantonal issues are taken. The citizens meet on a particular day of the year at a particular time and square in the canton's capital. This historical form of political participation by appearing in person is difficult to measure for various reasons. Some of the citizens arrive late to the meeting, and others leave for some time (e.g., to take a cup of coffee in a nearby restaurant) or leave for good. Moreover, the number of attendants is not counted but only estimated by the government. The careful study by Hofmann and Rother (2019) makes an effort to count the number of citizens attending the Landsgemeinde by using photographs, but, for the reasons given, the figures available reflect more an impression than a precise measure of the number of attendants.

The participation rate of citizens at the yearly Landsgemeinde is quite low, around 10% of the electorate. This is due to several factors: the location and time are fixed, i.e., the citizens have no flexibility when and how to cast their votes; more time is needed as the meetings take several hours; the weather may be unpleasant; and the participation rate and the votes cast are not anonymous. Figure 3 shows the few estimates available on the development of the rate of participation at the various Landsgemeinden.

Figure 2.3 Estimates of the rate of participation in the Landsgemeinde of the canton Glarus



Data source: Schaub and Leuzinger (2018), pp. 17-18.

Due to the missing data for a large number of meetings of the Landsgemeinde, it is difficult to draw any firm conclusion about whether the merger of 25 to three communes had any consistent effect on citizens' participation in political issues. A cursory examination hints at a falling, rather than a rising, long-term participation rate at the Landsgemeinde.

The descriptive data on vote participation presented suggest that the citizens of the canton Glarus to some extent have a reduced commitment to the three new communes. The results gained on the basis of the descriptive data are consistent with our hypothesis: The strong reduction in the number of communes in the canton Glarus negatively affects the democratic relationship of the voters to their political system.

2.5 Econometric Analysis

The objective of the econometric analysis is to verify the existence of the decision and implementation effect of the reduction in communes in Glarus on vote participation, as well as to determine the magnitude of these effects. The effects on vote participation for two different dates are estimated: 2008, after the merger decision was confirmed in the extraordinary Landsgemeinde; and 2011, when this decision was put into reality. In combination with two constructed control groups, this setting suits a Difference in Difference (DiD) analysis well. The first control group consists of every canton in Switzerland, except Glarus, while the second control group consists of Glarus' neighboring cantons.

The parallel trend assumption has to be fulfilled for causal interpretations. This requires the same development for voting participation in the pretreatment periods for the treatment and control groups. Visually, this can be confirmed by comparing Glarus and its neighbors in Figure 2.1 up to 2007. The divergence between 2007 and 2011 implies a violated parallel trend assumption for the implementation effect analysis. However, the effect increases after 2011, and therefore it seems reasonable to assume that the identifying assumption holds in this case.

Another indication of the fulfilled parallel trend assumption is the very similar development of different levels of vote participation in comparison to both control groups after 2007 and after 2011. This implies that the differences resulted from the reduction in communes and that later on, no significant event affected the treatment or control group specifically. This is a valuable reassurance for the robustness and interpretation of the results.

We employ two strategies to test the parallel trend assumption. First, we compare the average vote turnout across different pretreatment periods between Glarus and neighboring cantons and Switzerland. However, these statistical tests average the vote turnout across time and tend to be an indicator for the parallel trend assumption. We allow for unequal variances, but this modification does not change the results. Those show that the means in vote turnout are not statistically different from each other; the only exception is the case when Switzerland is taken as a comparison group. This hints at a potential violation of the parallel trend assumption. The results are depicted in Table B.2.5 in the Appendix.

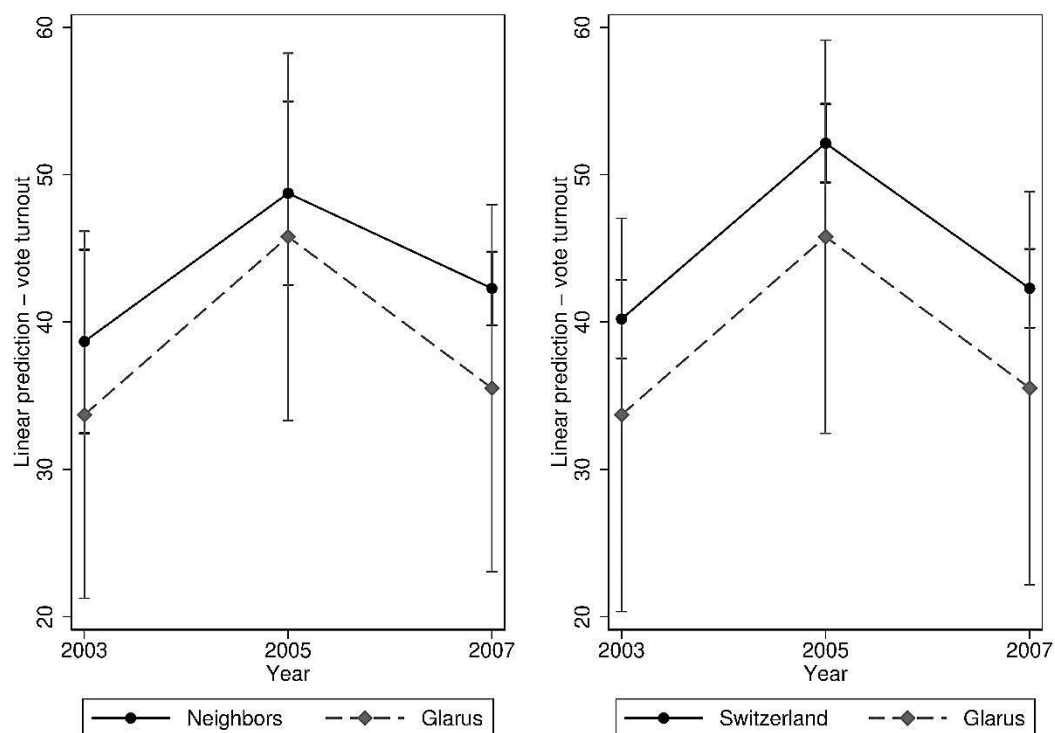
Thus, the second strategy consists of running a regression to compare the crucial slope coefficient of the interaction term. If this coefficient is not statistically significant for the pretreatment period, the slope is the same for both groups, which confirms the parallel trend assumption. The following regression notation shows the pretreatment comparison between Glarus and, e.g., neighboring cantons:

$$Y_{it} = \alpha_0 + \beta_1 Year2007_t + \beta_2 D_i + \beta_3 (Year2007_t * D_i) + \varepsilon_{it}$$

We calculated the slope coefficient with various specifications, where D_i represents the treatment. For the neighboring cantons and Switzerland, the time frames 1991/1995/2000 to 2007 and 1991/1995/2000 to 2010, respectively, resulted in the confirmation of the parallel trend assumption. These results constitute our strongest support of the assumption for the decision and implementation effect and are reported in Tables B.2.6 and B.2.7 in the Appendix.

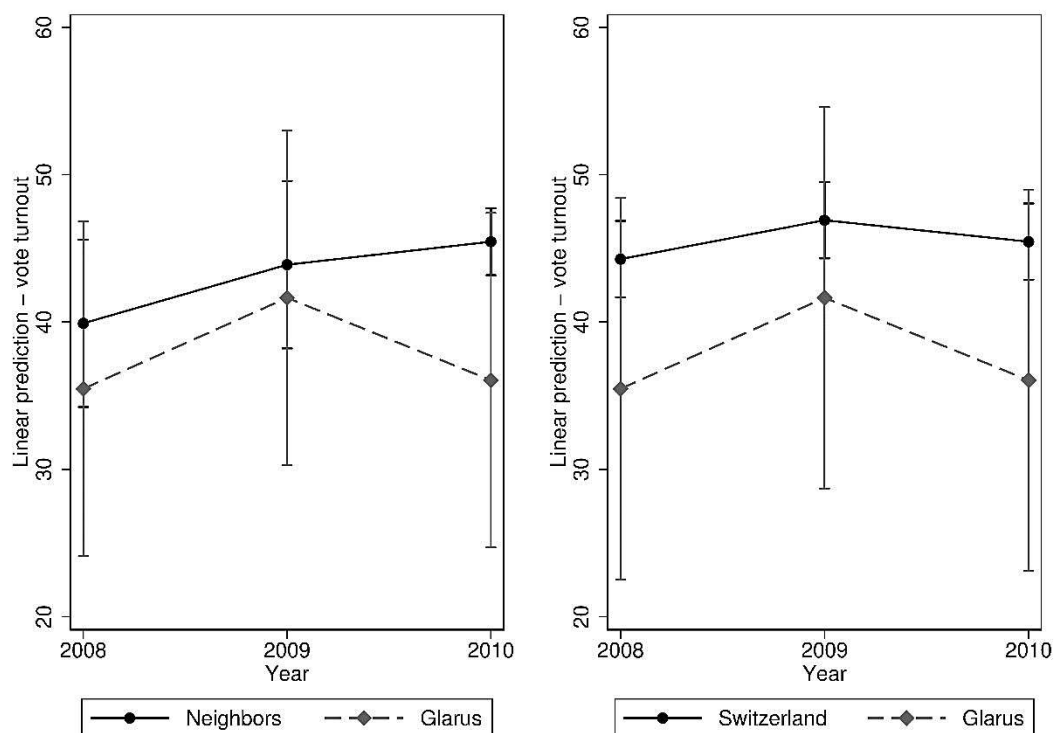
Figures 2.4 and 2.5 depict the visual illustration of the calculated margins from a linear regression. The figure on the left-hand side shows the development of Glarus in comparison with neighboring cantons from 2003 to 2007, and the right-hand side shows Glarus compared to Switzerland. The same applies to the two illustrations below, but these figures represent the development shortly before the implementation effect. The closer time frames to the treatment were chosen in accordance with the literature. This approach supports that those timeframes are relatively more relevant for the assumption to hold. Overall, given these results, we have no reason to believe that the parallel trend assumption is violated. The only critical case are the neighbors in the year prior to the implementation, where a visible divergence took place. However, this divergence is apparently not strong enough to manifest itself in a statistically significant difference in the slope comparison. Thus, the holding assumption underpins the approach to differentiate these effects.

Figure 2.4 Visualized pretreatment parallel trend assumption tests until 2007



Data source: Federal Statistical Office, 2022; Briviba et al., 2022.

Figure 2.5 Visualized pretreatment parallel trend assumption tests until 2010



Data source: Federal Statistical Office, 2022; Briviba et al., 2022.

All data, including the dependent variable, were obtained from the Federal Statistical Office and merged into our databases. In order to take into account various exogenous influences which may impact the comparisons, the following control variables on a cantonal level are taken into account: The extent of industrialization is proxied by the population density, rate of unemployment, education expenditure per capita, and income per capita. These variables control for economic and socio-demographic developments of the cantons.

All of them will also be used in the following two difference-in-difference estimates, respectively. Concerning the control variables, it is crucial only to include predetermined controls not affected by the treatment. Otherwise, controls that are affected by the treatment could distort the DiD estimator (Rosenbaum, 1984; Rubin, 2004). Since our control variables are on a cantonal level, the treatment is very unlikely to affect these controls.

The pretreatment periods for the following analysis cover the years 1991 to 2007. This is a period with a clearly visible parallel trend (Figure 2.1). In tables 2 and 3, the post-treatment periods range until 2019. One clear benefit of the DiD estimation is that any time-invariant heterogeneity between untreated and treated groups is controlled for, as well as group-invariant heterogeneity.

The DiD estimates presented in Table 2.2 indicate that vote participation in Glarus was significantly lower than in both control groups after the merger decision was confirmed at the end of 2007. In the first comparison of all cantons, the magnitude of the DiD estimator is -4.8 percentage points, which is equivalent to a decrease of 11.6 percent. This percentage, expressed in an absolute amount, are 1,230 people in Glarus who did not vote on a national level due to the merger of their communes. In the second comparison to the neighboring cantons, the magnitude of the DiD estimator is -5.5 percentage points, which is equivalent to 11.1 percent, which means that 1,404 fewer people voted in the post-treatment period. These percentage differences correspond well to the differences using descriptive data (Table 2.1), and in both cases, the DiD estimator is statistically significant at the 5% level.

This estimation result supports the interpretation that the decision to radically merge the communes in Glarus reduced the vote participation rate, reflecting a lower attachment of citizens to their political community.

Table 2.2 Difference-in-Difference estimate of vote participation in per cent in Glarus for the year 2008

Glarus vs. Switzerland, 2008			Glarus vs. Neighbors, 2008		
	Voting part.	T-value		Voting part.	T-value
Before			Before		
Switzerland	45.255		Neighbors	51.892	
Glarus	41.615		Glarus	49.527	
Diff (T-C)	-3.640	-2.33	Diff (T-C)	-2.366	-1.20
After			After		
Switzerland	46.847		Neighbors	55.311	
Glarus	38.397		Glarus	47.459	
Diff (T-C)	-8.450	5.32	Diff (T-C)	-7.852	4.17
DiD	-4.810	2.18	DiD	-5.487	2.11
R^2	0.08		R^2	0.20	
# of obs.	475		# of obs.	95	

Data Source: Federal Statistical Office, 2022; Briviba et al., 2022.

Table 2.3 shows similar results for the year 2011, in which the decision to substitute 25 communes with three was effectively implemented. In comparison to all other cantons, the voting participation in Glarus decreased by 4.4 percentage points in the post-treatment period. This result is statistically significant on the 10% level and is equivalent to 10.8 percent and 1,143 people in Glarus who did not vote following the shock in 2011. In comparison to the neighboring cantons, voting participation in Glarus decreased by 5.5 percentage points in the post-treatment period. The DiD estimator is statistically significant on the 5% level and is equivalent to 11.4 per cent and 1,441 people in Glarus.

Table 2.3 Difference-in-Difference estimate in vote participation in per cent in Glarus in 2011

Glarus vs. Switzerland, 2011			Glarus vs. Neighbors, 2011		
	Voting part.	T-value		Voting part.	T-value
Before			Before		
Switzerland	45.469		Neighbors	51.798	
Glarus	40.924		Glarus	48.573	
Diff (T-C)	-4.545	-3.46	Diff (T-C)	-3.225	-1.98
After			After		
Switzerland	47.441		Neighbors	55.766	
Glarus	38.495		Glarus	46.993	
Diff (T-C)	-8.947	4.19	Diff (T-C)	-8.773	3.58
DiD	-4.402	1.77	DiD	-5.548	2.00
R^2	0.09		R^2	0.22	
# of obs.	475		# of obs.	95	

Data Source: Federal Statistical Office, 2022; Briviba et al., 2022.

The extent of the decreasing voting participation in Glarus compared to its neighbors seems similar for both shocks in 2008 and 2011, which is surprising at first glance. However, considering the before and after differences between treated and not treated groups, the explanation is clear. In 2011, the pretreatment difference between Glarus and its neighboring cantons was higher than in 2007, which indicates a divergence between 2007 and 2011, which is shown in table 2.2 (Decision effect). However, the post-treatment difference for the same comparison is also higher than in 2007, indicating an increasing divergence between the two groups even after 2011 (Implementation effect). It is hard to precisely distinguish the magnitude of the implementation effect and the decision effect. This is due to the short period between the two shocks and because the decision effect is still active when the implementation effect occurs. However, we find strong evidence that supports the existence of the implementation effect.

2.6 Glarus as a Synthetic Control

In addition to the DiD analysis, we apply the synthetic control method to compare and verify the results obtained. This method developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015) constructs a counterpart of the treated unit, in our case, a synthetic canton Glarus. It is well established as a suitable method to analyze the effects of policy reforms or commune mergers and has been applied in this context many times. For instance, Rösel (2017) analyzed expenditures following commune mergers, and Fowler (2013) investigated the effect of compulsory voting on voter turnout in Australia. The idea of establishing causality is quite similar to the DiD approach. The

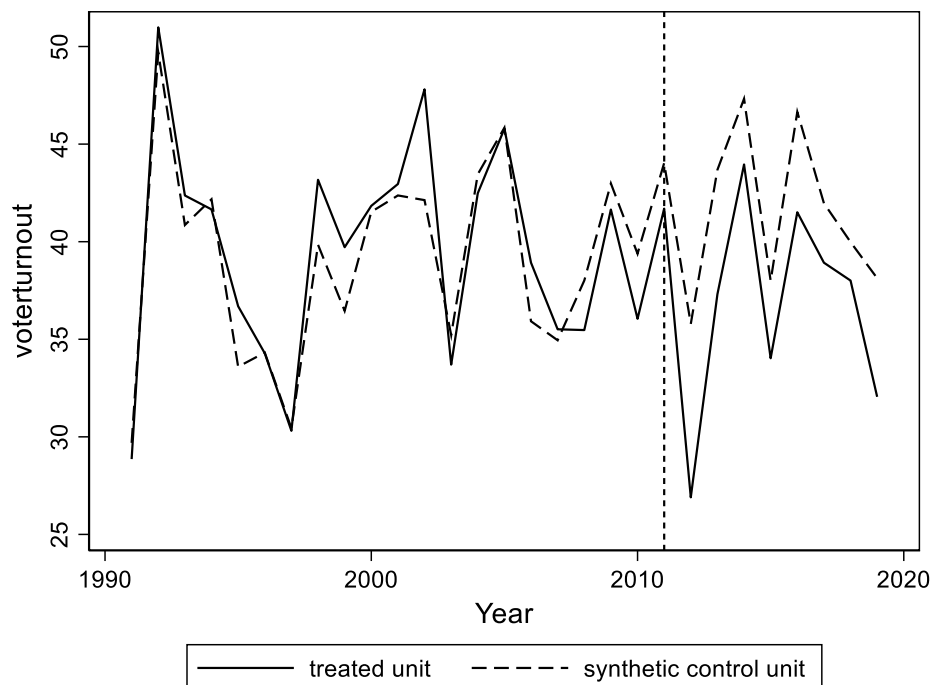
identification assumption states that in the absence of the treatment, Glarus would have evolved in the same way as the constructed counterpart based on the pretreatment periods. From the donor pool, in our case, all other cantons in Switzerland, a simple weighting procedure creates a closely-fitting synthetic Glarus with respect to the outcome variable (vote turnout).

By matching the pretreatment trend of the vote turnout in all other cantons in Switzerland, we construct a closely fitting synthetic control, as can be seen in Figure 6. The optimized synthetic Glarus is composed by 49.2% of the canton Uri, 33.4% Graubünden, 11.4% Tessin and 6.1% Freiburg. As 82.6% of the weights are allocated to neighboring cantons to Glarus, the assumption made in the DiD analysis that neighboring cantons are a well-suited comparison group is strongly supported.

The optimization calculation of the best-fitted weights to construct a synthetic Glarus in Stata was extended by the option `nested` and `allop`. In combination, both options lead to fully robust results by running the optimization multiple times at three starting points. The only trade-off is computation time.

Additionally, we include the following predictive variables to improve the accuracy of the post-treatment development of the synthetic Glarus: Population density, unemployment rate, the number of residents, and average income per capita on a cantonal, annual basis. These variables were chosen after consulting the literature on the established determinants of voter turnout (Merlo, 2006; Cancela & Geys, 2016).

Figure 2.6 Voter turnout in Glarus and its synthetic counterpart from 1991 to 2019



Data source: Federal Statistical Office, 2022; Briviba et al., 2022.

Figure 2.6 reveals that before the crucial date of 2010, when the 25 communes were merged into three, the voter turnout in the canton Glarus synthetically produced closely follows the actual voter turnout. After 2010 the situation is quite different: the voter-turnout in the actual canton Glarus is clearly and consistently below the synthetic one. This suggests that there has been a marked negative effect on voter participation, i.e., the citizens reveal a lower involvement in the political system.

However, certain assumptions have to be fulfilled to establish causality (Rösel, 2017). First, the pretreatment trends of the synthetic Glarus follow the pretreatment outcome sufficiently close. As can be seen in Figure 2.6, this assumption is not violated. A slight divergence can be observed after 2007, where the previously mentioned decision effect might influence the outcome variable to a small degree. However, the common trend is clearly visible and even holds 3 with a larger difference 3 for the post-treatment periods. Second, the pretreatment predictors should match sufficiently well. The balance of the predictions is quite close in the case of income per capita, the age composition (persons above age 65), and the unemployment rate. This is less the case for population size and population density (see Appendix).

Third, no other reforms were implemented, and the untreated donor pool cantons were not affected. In the treated canton Glarus, no further commune mergers were implemented in the following years. It cannot be excluded that other reforms might have potentially affected voter turnout. However, we believe that the extent of such a radical constitutional change is unique in the respective time frame and, therefore, the major driver of our results. Furthermore, to our best knowledge, there is no reason to believe that this reform affected other cantons in any substantial or relevant way. Thus, the assumptions for a causal interpretation are well fulfilled. Table 2.4 compares the DiD estimates to the synthetic estimates.

Table 2.4 Differences in Differences in voter turnout in Glarus vs. synthetic Glarus 1991-2019

	1 st year	2 nd year	3 rd year	4 th year	5 th year	6 th year	7 th year	2012- 2019
Glarus Pre/Post Difference	-12,71	-7,51	-3,56	-4,07	-2,87	-2,51	-2,38	-3,03
Synth Pre/Post Difference	-3,40	0,55	3,08	2,01	3,10	3,05	2,73	2,26
Difference in Difference	-9,32	-8,06	-6,64	-6,08	-5,98	-5,56	-5,11	-5,28

Data source: Federal Statistical Office, 2022; Briviba et al., 2022.

Table 2.4 shows the annual differences over seven years between pre- and varying post-treatment periods for Glarus and synthetic Glarus. The last row indicates the difference in differences between vote turnout outcomes. The first two years after implementing the drastic merger of communes reveal a considerable difference (between eight and nine percentage points). The difference becomes somewhat smaller in later periods, but the size remains considerable (more than five percentage points). Over the whole period after the merger (2012-2019), the difference amounts to more than five percentage points, i.e., the vote turnout was clearly lower after the merger than before the merger. It is significant that the difference in vote participation is maintained even after seven years, suggesting that the constitutional change undertaken has long-run consequences for the relationship between the voters and the political system. This is a rather surprising result; it indicates a trade-off between simplification of the institutional structure and the involvement of citizens in political decision-making.

2.7 Conclusions

One of the major expectations has regularly been that a smaller number of communes leads to efficiency gains. However, the literature has shown that the expected economic benefits of merging communes in Switzerland are small and, in some cases, cannot be observed at all. Nevertheless, from 1990 until today, the number of communes in Switzerland has drastically decreased by about 30%. This reduction in the number of communes stands in contrast to the historical stability of the Swiss local government system and underpins the importance of research on commune mergers and their effects.

In the case of the canton of Glarus, where the number of communes has been by far, the most reduced in Switzerland, we find a significant decrease in the share of citizens participating in political decisions on a national level. The descriptive data on vote participation at the Landsgemeinde hints at a falling, rather than a rising, long-term participation rate. This trend suggests that the citizens of the canton Glarus to some extent have a reduced commitment to the three new communes and is consistent with our findings at a national level. This development is worrying as vote participation is a crucial indicator of the quality of participatory democracy and constitutes a crucial source of legitimacy. Such a decline in vote participation indicates a lower attachment of the electorate to democratic politics.

A strong driver is the diminished emotional connection to the place of residence. This unfortunate development may possibly reverse itself in the coming years when the population becomes more accustomed to the three large new communes. However, our analysis indicates that the fall in voter participation has not reversed within eight years after the merger from 25 to three communes. The result based on a DiD analysis in which we compare the development of vote turnout in Glarus to neighboring cantons, and all cantons overall has been supported by the synthetic control method. The empirical results range from a 4.4 to 5.5 percentage point decrease in vote participation in canton Glarus due to the merger. We obtain statistically significant and substantive results for the decision and implementation effect. Even though the differentiation between those effects is difficult due to the short period between the two shocks, we find strong

evidence that supports the existence of the implementation effect. Nevertheless, it cannot be excluded that the citizens' attachment to their political unit improves over a longer time span. This aspect must be left to future research in which the long-run consequences can be observed.

Other (political) institutions and thus different forms of political participation may also have suffered. According to the respective function within the local society, their degeneration might be more or less detrimental to the democratic relationship and, thus, decrease political participation even stronger. In short, social structure matters for political participation (Scheufele et al., 2004).

It remains to be answered how and under which circumstances these effects on citizens' vote participation can be mitigated by the commune merger's design, implementation, trust in political decision makers, individuals' identification with the region, or other mechanisms. Those insights should play a crucial role in future decision-making processes concerning commune mergers. We suggest institutionalizing countermeasures to the residents' alienation from the political process when communes are merged. For instance, residents should be involved in the decision-making about core aspects of identification value, such as the flag or name of the new commune. This is expected to foster local attachment and mitigate alienation from the political process. Overall, it is vital to substitute the altered opportunities for local political involvement, which we believe will mitigate the decrease in vote participation on the national level.

Radcliff (1994) argues that in the United States, even modest changes in turnout have major implications on party strategy and even presidential elections. A higher turnout is linked to higher participation of Democratic voters. This has implications for the commune merger in Glarus. If abstaining from political participation is systematically correlated to party preferences, the decisions taken will not represent the electorate properly. It might even be exploited by fostering or preventing commune mergers to maximize votes on a cantonal or national level. Incentives may be created, outweighing the interests of the local citizens and reducing their political participation.

Our analysis can be considered a quasi-natural experiment. While the number of independent communes was considered to be excessive for several reasons, the decision in the *Landsgemeinde* in 2006 to reduce their number from 25 to three was unexpected. Therefore, it was an exogenous shock.

The decision to radically reduce the number of communes in Glarus was taken by the citizens. In other countries, such decisions are taken by the political authorities, the parliaments, and the executive. This would suggest that the implementation effect should be of a similar size, independently of the decision-making actor. However, the decision effect should be smaller where the citizens are directly involved.

It might be argued that Glarus is a small canton with small communes in a small country. This is certainly true but allows us to study the effect of a radical commune merger on vote participation on a national level in detail. A major lesson to be drawn is not to neglect the effects of changes in local democracy on vote participation at the national level.

The consequences are beyond the economic ones, which in the case of Glarus, are rather small, if they exist at all. This means that individuals (and firms) are either less affected by such a drastic change or that they adjust more quickly than is the case for the more deep-seated relationship to the political environment. Our findings support this conclusion. Voters' rate of political participation stays low after the merger for a substantial number of years. The body of citizens is not solely annoyed in the short run, but there are long-run consequences on how citizens feel and take political action in their political community.

This result should be seriously considered when communes are merged. It may help citizens understand the likely outcomes better, and it may inform governments when they impose reductions in the number of communes from above, as has been the case in other countries. As many countries consider reducing the number of communes in the future; the negative effects on political participation should be considered and mitigated.

Appendix Chapter 2.

Table B.2.5 Two-sample t-tests of average vote turnout - parallel trends tests

Variable	#Obser.	Mea	t test	Variance	time frame
Glarus	17	39,8	Equal variance		1991-2007
Neighbors	68	40,6			
diff = mean(G) – mean(N)		t = -0.52			
Ho: diff = 0		degrees of freedom = 83			
Ha: diff != 0		Pr(T > t) = 0.6072			
Glarus	17	39,8	Unequal variance		1991-2007
Neighbors	68	40,6			
diff = mean(G) – mean(N)		t = -0.50			
Ho: diff = 0		Satterthwaite's degrees of freedom = 23.9			
Ha: diff != 0		Pr(T > t) = 0.6193			
Glarus	13	39,4	Equal variance		1995-2007
Neighbors	52	40,3			
diff = mean(Glarus) – mean(Neighbors)		t = -0.55			
Ho: diff = 0		degrees of freedom = 63			
Ha: diff != 0		Pr(T > t) = 0.5848			
Glarus	8	41,1	Equal variance		2000-2007
Neighbors	32	42,9			
diff = mean(G) – mean(N)		t = -1.01			
Ho: diff = 0		degrees of freedom = 38			
Ha: diff != 0		Pr(T > t) = 0.2827			
Glarus	2	39,5	Equal variance		1991-2010
Neighbors	80	44,1			
diff = mean(G) – mean(N)		t = - 0.96			
Ho: diff = 0		degrees of freedom = 98			
Ha: diff != 0		Pr(T > t) = 0.3358			
Glarus	17	39,8	Equal variance		1991-2007
Switzerland	425	43,9			
diff = mean(G) – mean(N)		t = -3.22			
Ho: diff = 0		degrees of freedom = 440			
Ha: diff != 0		Pr(T > t) = 0.0014			
Glarus	20	39,5			1991-2010
Switzerland	500	44,1			
diff = mean(G) – mean(N)		t = -4.3			
Ho: diff = 0		Degrees of freedom = 518			
Ha: diff != 0		Pr(T > t) = 0.0000			

Table B.2.6 Parallel trend assumption regression results for 2007

	(1) Vote turnout	(2) Vote turnout	(3) Vote turnout	(4) Vote turnout	(5) Vote turnout	(6) Vote turnout
Year2007	-2.867 (-1.25)	-1.709 (-0.74)	-3.450 (-1.61)	-4.187 (-2.24)	-4.187 (-2.24)	-4.187 (-2.24)
Treat	-59.06 (-0.05)	591.8 (0.35)	1727.4 (0.62)	-782.9 (-0.53)	73.62 (0.04)	1188.8 (0.35)
Year	0.569 (3.70)	0.342 (1.92)	0.454 (2.49)	0.291 (3.23)	0.291 (3.23)	0.291 (3.23)
1.Treat#c. Year	0.0261 (0.04)	-0.298 (-0.36)	-0.864 (-0.62)	0.387 (0.52)	-0.0401 (-0.04)	-0.596 (-0.35)
_cons	-1096.6 (-3.57)	-643.1 (-1.81)	-864.8 (-2.38)	-537.0 (-2.99)	-537.0 (-2.99)	-537.0 (-2.99)
N	112	112	112	427	427	427

Note: The periods from 1991,1995,2000 to 2007 are depicted in regression 1-3 in comparison with neighbors. In regressions 4-6 Switzerland serves as the comparison group for the same periods.

t statistics in parentheses.

Table B.2.7 Parallel trend assumption regression results for 2010

	(1) Vote turnout	(2) Vote turnout	(3) Vote turnout	(4) Vote turnout	(5) Vote turnout	(6) Vote turnout
Year2010	1.310 (0.64)	2.620 (1.29)	1.440 (0.73)	-0.647 (-0.37)	-0.647 (-0.37)	-0.647 (-0.37)
Treat	167.1 (0.16)	808.6 (0.64)	1880.3 (1.02)	-432.2 (-0.36)	396.1 (0.26)	1429.5 (0.63)
Year	0.397 (3.47)	0.190 (1.50)	0.218 (1.61)	0.202 (3.03)	0.202 (3.03)	0.202 (3.03)
1.Treat#c. Year	-0.0878 (-0.17)	-0.407 (-0.65)	-0.940 (-1.02)	0.210 (0.35)	-0.202 (-0.27)	-0.716 (-0.63)
_cons	-754.3 (-3.30)	-338.1 (-1.34)	-393.4 (-1.46)	-360.1 (-2.70)	-360.1 (-2.70)	-360.1 (-2.70)
N	124	124	124	502	502	502

Note: The periods from 1991,1995,2000 to 2010 are depicted in regression 1-3 in comparison with neighbors. In regressions 4-6 Switzerland serves as the comparison group for the same periods. t statistics in parentheses.

Chapter 3. Publish under Pressure – an Empirical Analysis of Academics’ Strategic Behavior*

Abstract

This chapter investigates the publishing behavior of economics scholars. The change in the weights attributed to research and researchers’ evaluation criteria results in promotion committees relying heavily on publication metrics. These developments cause publication pressure and subsequent strategic adaptations. The perceived publication pressure is heavily dependent on the academic rank and reaches its maximum at the assistant professors without tenure. Furthermore, academics’ journal selection strategy and resilience concerning rejections are investigated. Unexpectedly, scholars at German ‘Excellence Universities’ compared to other universities in German-speaking countries do not feel more burdened by the ‘publish or perish’ need, nor do they differ with respect to their journal submission strategy and the resilience to having papers rejected.

3.1 Introduction

Anyone who wants to do a doctorate, achieve an assistant professorship, or aspire to a full professorship eventually, is expected to contribute to scholarly journals (Akerlof, 2020; Heckman & Moktan, 2020; Osterloh & Frey, 2020). Scholars are induced to publish in international scientific journals considered to be leading in their discipline. In economics, these are often understood to pertain to the ‘Top Five’. The possibility to publish in scientific journals is controlled by editors and reviewers whose assessment of a contribution is final (Hamermesh, 1994; Medoff, 2003; Card & Della Vigna, 2020; Briviba & Frey, 2023). Publication in these leading international journals is not only strongly time-consuming but also very difficult; the rejection rate is high (Conley & Önder, 2014), especially for outsiders. Clubs and networks also play a role (Colussi, 2018; Carrell et al., 2022).

In contrast to approaches measuring publication pressure, such as implemented by Haven et al. (2019), we additionally investigate the extent to which these conditions influence the behavior of scholars in economics and business studies. An extensive survey of university scholars at different stages of their academic careers (doctoral students, post-doctoral students, assistant professors without and with tenure, permanently employed full professors) was conducted in three countries, Germany, Austria, and (German-speaking) Switzerland. The data serve to understand how decisions during the publication process take place and how researchers react to different

* This chapter is a collaborative working paper with Fabian Scheidegger and Bruno S. Frey. I want to thank the participants of the Max-Planck-Institute for Tax Law and Public Finance VIII& Seminar, especially Kai Konrad, Ronnie Schöb and Joachim Weimann for great ideas and constructive feedback.

circumstances. We most importantly analyze how strongly publication pressure is subjectively felt and what its determinants are. Moreover, we study the reactions regarding paper submissions to scholarly journals and the resilience to rejections of submitted manuscripts.

The results of our empirical analysis of the 558 respondents show that post-doctoral students and assistant professors without tenure subjectively feel an urgent pressure to publish in academic journals. The very high proportions among these groups suggest that there exists intensive publication pressure for scholars starting to engage in an academic career. This feeling nowadays applies to some extent even to doctoral students. The pressure to publish across academic positions mimics an inverted U-shape as it increases from being a doctoral student and is highest for assistant professors without tenure and then falls when tenure has been achieved.

The ideal procedure of first engaging in research and to choose a journal later is still prominent among all academic scholars. The extent of subjectively felt publication pressure does not seem to play a role. Nevertheless, one-quarter of assistant professors first want to find out what journal would be suitable to publish in and only thereafter focus on the corresponding research to be undertaken. This implies a strategic adaptation during the most crucial time of an academic career due to the publication requirements for obtaining tenure. Economists employ the strategy of first choosing a journal more often than do business economists. Economists also are more prepared to resubmit a paper more often after a previous rejection than are researchers in business.

Scholars at German <Excellence Universities> do not feel more burdened by the «publish or perish» situation than are scholars at other universities, nor do they differ regarding their journal submission strategy and the resilience to having papers rejected. Administratively determined «excellence» does not seem to have a strong impact on academia with respect to publications.

Section 3.2 provides an overview of the existing literature on the subject. The following section 3.3 describes the methodological approach to the survey. The theoretical hypotheses are developed in section 3.4. The following section contains the analyses and results, which are presented in section 3.5. The final section 3.6 puts the results into a larger context.

3.2 Related Literature

The organization and functioning of science at universities is the subject of a large number of contributions, including in the field of economics (e.g., Colander & Klammer, 1987; Hamermesh, 2013, 2015; Stock & Siegfried, 2014; Lanteri & Vromen, 2014; Haucap & Muck, 2015; Osterloh & Frey, 2020; Harvey & Hirshleifer, 2020; Kasy, 2021; Briviba & Frey, 2023; Zantout et al., 2022). For some time now, in addition to detailed presentations and discussions (e.g., Harley et al., 2004; Stock & Siegfried, 2014; Haucap et al., 2021), various authors have come down hard on the publishing system prevailing in economics. Hirshleifer (2014) states that the reviewers' reputation-building incentives may suppress innovative research (see evidence in Hadavand et al., 2020). A shortcoming is the increased number of revisions, robustness checks, and extensions, leading to <extensive

reviewing=. <[...] for many researchers, the only research questions and projects that appear viable are those that can meet the demands of scoring well in terms of metric performance indicators [...] in relatively short amount of time=. (Müller & de Rijcke, 2017, p. 165). Nobel laureate James Heckman also harshly criticizes this situation: The existing system <incentivizes careerism rather than creative scholarship= and is a <tyranny= (Heckman & Moktan, 2020, p. 464). It has, for instance, been pointed out that Nobel Prize winner William Vickrey published his contributions in <obscure= journals (Colander, 2014, p. 156). According to Harvey (2017, p. 1434) there is a <[...] proliferation of papers that are technically well executed but that advance our knowledge only marginally=. According to Zanout et al. (forthcoming), the same hold for economics, though to a somewhat smaller degree than in finance (see also Ghoshal, 2005; Adler & Harzing, 2009; Andrew et al., 2020; Reed et al., 2021). Hopwood (2007) points out that the existing individual careerism encourages <conservatism and conformity= (see Starbuck (2007) in organization studies and Alvesson and Sandberg (2013) for the negative consequences of gap-spotting research). Similar views about the system have been uttered in Europe. For example, the journal *Horizonte* of the government Swiss Council of Science and Humanities states (Hochstrasser, 2021, p. 14): <Those who do not publish their research do not exist=, and describe this as a <merciless law= and <absurdity=.

Nobel Prize laureate Akerlof (2020, p. 411, 409) emphasizes in an important contribution: <The market for academic research which is the economics journals, leaves researchers with no choice but to foresee the dictates of the editors and referees= and <... tenure and promotion committees are increasingly relying upon journal metrics to make decisions, with the number of <Top Five= publications given particular weight=. The <leading scientific journals= are clearly defined for the discipline of economics: *American Economic Review*, *Quarterly Journal of Economics*, *Journal of Political Economy*, *Econometrica* and *Review of Economic Studies* (Card & DellaVigna, 2013; Hamermesh, 2013). Anyone who publishes in one of these five journals strongly promotes his or her academic career. In the United States, the probability of those with one such publication to get tenure increases by 80 per cent, and the chances of those who have two such publications increase by as much as 230 percent, always compared to those individuals who have the same number of publications in scientific journals outside the <Top Five= (Heckman & Moktan, 2020). For this reason, there is a strong incentive for those who want to pursue an academic career to publish in such leading international journals.

As empirically shown (Ellison, 2002a, 2002b; Cotton, 2013), the publication process in economics has slowed down over time. Many months, if not years, pass between the first submission, various revisions, and final acceptance. This delay is very stressful for young scholars who want to pursue an academic career because their employment conditions are quite precarious and often extend over only three or perhaps four years. Accordingly, they have to decide whether to submit an article to one of the top journals where a decision is slow and the probability of acceptance is low or whether it is better to submit to a less well-regarded journal, but where the decision is expected to be faster, and the probability of acceptance is higher.

3.3 Data and Survey Methodology

To investigate the perspectives of academics in the field of economics and business administration regarding the publication process, a survey was considered most suitable. One major reason is the difficulty of obtaining information from journals or publishers, mainly based on an unwillingness to provide corresponding data for scientific purposes. For instance, the PEERE initiative ceased to exist recently. Its goal was to improve the transparency and accessibility of data about the scientific peer-review process. Our survey was sent out to economics and business administration academics employed at a university between 11 October 2021 and 30 November 2021. Our geographical region of interest is the German-speaking region (Germany, Austria, and the German-speaking part of Switzerland). After excluding all technological and pedagogical universities, our sample of universities consists of all remaining universities in Austria (6) and Switzerland (6). For Germany, all eight so-called <Exzellenz Universitäten= (excellence universities) were selected along with eight randomly chosen universities as a comparison group. This comparison was implemented to investigate the potential differences between these groups of universities.

In total, our sample consists of 26 universities⁵. Among the universities, economics and business administration faculties were differentiated and received - with one exception - the same questions in the survey. Only one question was slightly modified due to the particularity of the Top Five journals in economics (the survey questions are shown in the Appendix). A further reason for the differentiation between economics and business studies are the varying standards and customs, also with respect to publishing.

In order to qualify for the survey, an academic in the sample must hold either a doctoral, post-doctoral, assistant professor, or full professor position at a university. While professors are usually labelled clearly on university websites, the same does not hold true for doctoral and post-doctoral academics. Therefore, the sample of academics was restricted to the positions ex-ante, whenever the university website labelled the positions in a clearly identifiable way. However, some universities would list all their staff, which are not employed as professors as <scientific employees=. In these cases, everyone was included, and the correct identification of a position relies on truthful self-reporting of the respective position in the survey. However, the differentiation by the respective academic titles allowed us to ensure approximate conformity. The sample was then accurately filtered ex-post. The detailed sample is depicted in Table 3.1. A further

⁵ The Excellence Universities are Rheinische Friedrich Wilhelm University Bonn, Free University of Berlin and Humboldt University of Berlin, University of Hamburg, Ruprecht Karl University of Heidelberg, University of Constance, Ludwig Maximilian University Munich, Eberhard Karl University of Tübingen. The two universities in Berlin that have joined together to form an excellence network are treated separately; the other universities in Germany included in our sample are University of Bochum, Duisburg-Essen, Rostock, Bayreuth, Passau, Kassel, Magdeburg, and Ulm. The Swiss universities in our sample are the following: University of Zurich, Bern, Fribourg, Luzern, St. Gallen, and Basel. The University of Graz, Innsbruck, Krems, Klagenfurt, Linz, Wien, as well as the WU Wien are located in Austria.

criterion to complete the survey was the necessity of having at least one scientific publication.

Table 3.1 Sample of all invited academics vs. sample of all valid responses.
Percentages by country are reported in paratheses

		Gender			Discipline	
Country	N	Females	Males	No answer	Business	Economics
Invited						
Total	4166	1542	2624	.	2264	1902
	(100.00)	(37.01)	(62.99)		(54.34)	(45.66)
Austria	1515	617	898	.	947	568
	(100.00)	(40.73)	(59.27)		(62.51)	(37.49)
Switzerland	826	285	541	.	326	500
	(100.00)	(34.50)	(65.50)		(39.47)	(60.53)
Germany	1825	640	1185	.	991	834
	(100.00)	(35.07)	(64.93)		(54.30)	(45.70)
Responded						
Total	558	157	394	7 (1.25)	270	288
	(100.00)	(28.14)	(70.61)		(48.39)	(51.61)
Austria	224	79	143	2 (0.89)	130	94
	(100.00)	(35.27)	(63.84)		(58.04)	(41.96)
Switzerland	134	31	101	2 (1.49)	52	82
	(100.00)	(23.13)	(75.37)		(38.81)	(61.19)
Germany	200	47	150	3 (1.50)	88	112
	(100.00)	(23.50)	(75.00)		(44.00)	(56.00)

The survey was designed for academics in the German-speaking region and was constructed on the platform SoSci Scientific Survey. This platform is established in the scientific community for this purpose and has been widely used for comparable endeavors (Leiner, 2019; Sieweke et al., 2014). The participants could choose to answer the survey in either German or English. 27 percent chose to answer the survey in English. After executing a pretest, the number of questions was restricted to 8 questions and 5 demographic questions.

Overall, 4,166 surveys were sent to the doctoral students, post-doctoral students, assistant professors without and assistant professors with tenure, and professors. The invitation included a personalized invitation link to rule out the possibility of multiple responses from the same person. In addition, a reminder was sent one week later (following Dillman, 2000). The survey was available for two weeks, from 1 December 2021 to 15 December 2021. After excluding non-deliverable emails and the cases of longer parental leave or non-availability of academics, the adjusted overall response rate is 14 percent (calculated in accordance with Kent & Brandal, 2003). Reasons for non-availability were parental leave, holidays, and absence due to illness. In comparison to response rates of online surveys, this outcome is typical (Sauermann & Roach, 2013).

3.3.1 Sample Description

Table 3.1 illustrates the composition of invited academics and the actual respondents. This allows us to approximately confirm the representativeness of our sample with the population of academics. The different response rates across countries, ranging from 11% to 16%, are not substantial. They might be due to varying schedules of academics concerning exams, coursework, and other duties across the three countries. Lundberg and Stearns (2019) investigate the share of women in US elite economics departments over time. In 2017, the share of female PhDs was slightly above 30%, while the share of female assistant and associate professors was around 23%. In line are the results from Friebe et al. (2021), where they report a share of females in the economics departments across Germany of 29.2%. In addition, they report a similar share of women in academia in Austria and the German-speaking part of Switzerland. As such, the total share of female respondents in our sample, 28%, seems to reflect well the actual distribution in academia. Comparing the response rates by discipline, the differences between business, 12%, and economics, 15%, are small.

Table 3.2 offers information about the composition of career positions in our sample. Overall, 558 academics responded fully to the survey. In contrast to our sample, the share of doctoral students at German economics faculties is about 50% (Friebe et al., 2021). However, due to the requirement of having published at least one paper in a scientific journal, the share of doctoral students eligible for the survey decreases significantly.

Table 3.2. Academic positions among valid responses. Percentages of the total are reported in paratheses

Country	N	Doctoral Student	Post-Doctoral Student	Ass. Prof. without tenure	Ass. Prof. with tenure	Professor
Total	558 (100.00)	104 (100.00)	112 (100.00)	50 (100.00)	60 (100.00)	232 (100.00)
Austria	224 (40.14)	33 (31.73)	38 (33.93)	26 (52.00)	38 (63.33)	89 (38.36)
Switzerland	134 (24.01)	21 (20.19)	35 (31.25)	6 (12.00)	14 (23.33)	58 (25.00)
Germany	200 (35.84)	50 (48.08)	39 (34.82)	18 (36.00)	8 (13.33)	85 (36.64)

3.3.2 Methodology

To determine the influence of the independent variables on publication pressure, the journal selection strategy and the resilience of academics, we apply an ordinary least squares (OLS) regression strategy. The regressions are computed using Stata 17, controlling for robust standard errors. To further control for robustness, regressions where outliers with a Cook9sDistance greater than one were excluded, and remaining observations are iteratively weighed according to their residuals up to predefined tolerance. However, the results change to such a small degree that those regressions are not reported.

All independent variables are dummy variables, and concerning the academic positions, participants of our survey with the title Professor are the omitted baseline. The following regression shows the determinants for publication pressure:

$$\begin{aligned}
 PubPressure_i = & \alpha + \beta_1 * Doctoral\ Student_i + \beta_2 * Post\ Doc_i + \beta_3 * Ass.\ Prof.\ without\ tenure_i \\
 & + \beta_4 * Ass.\ Prof.\ with\ tenure_i + \beta_5 * Others_i + \beta_6 * Economics_i + \beta_7 * Austria_i \\
 & + \beta_8 * Switzerland_i + \beta_9 * Male_i + \beta_{10} * Respondent\ in\ English_i
 \end{aligned}$$

Similarly structured equations are estimated for the dependent variables journal selection strategy and resilience of academics.

3.3.3 Limitations

The manually collected contact data is complete to the authors' best knowledge. However, one limitation is that contact details of academics were sporadically not publicly available. The only systematic lack of data was most commonly observed for the position of external doctoral students. Thus, we cannot infer robust results for this group of academics and, therefore, do not analyze this group in depth. Furthermore, lecturers are excluded as publishing is not their primary activity. We do not find any substantial reason for a survey bias for all other academic positions of interest.

The survey method inherently imposes limitations, such as that we were unable to collect contact information whenever this information was not made publicly available for a given university. This inevitably means that a small share of academics employed at universities was likely missed in our sample and was not invited to participate in the survey. This could especially be the case for newly hired staff, where the contact information was not yet updated but also for academics, where we could observe bugs in the information system (e.g. redirecting to different staff). A potential limitation is a self-selection of responding academics who have a critical view of the publishing process. This would systematically bias the results of the analysis. However, the neutral formulation of our initial description and invitation to participate in the survey did not indicate any intended direction.

As the likelihood of participating in a survey decreases with its length, the authors restricted the number of questions (Deutschens et al., 2004). However, this trade-off imposes another limitation as the number of explanatory variables is limited. Overall, the limitations mentioned should be considered but do not suggest a biased sample or results.

3.4 Theoretical Hypotheses

The empirically testable hypotheses proposed are based on the rational choice approach. The more costly an action is, the less it is pursued, and instead, individuals resort to an alternative. Individuals intending to engage in an academic career adjust their behavior to the requirements (Osterloh & Frey, 2014). With regard to publication behavior in academia, six theoretical hypotheses are derived:

Determinants of publication pressure

As reputation, salary, and job security are mainly tied to the career position in academia, the position is likely to be a strong determinant for publication pressure. Scholars across career positions focus their activity on writing papers, a metric easily observable, rather than on teaching, administrative tasks, or leisure. The pressure to publish is the highest when the publication requirement is the most stringent. This occurs when a scholar has reached an assistant professorship but not yet with tenure. It is well known that to get tenure, the most important factor is the number and quality of publications (Graber & Wälde, 2008; Osterloh & Frey, 2009; Müller & de Rijcke, 2017). In contrast, scholars with tenure can afford to publish less; they can follow more easily their intrinsic motivation to make their research known to outsiders. Brogaard, Engelberg and

Van Wesep8 (2018) findings support the claim that following tenure, researchers in economics publish less (15%) and obtain lower citation rates. Doctoral students are also under lower publication pressure because they still have time to produce publications, and the requirements for a post-doctoral position are less demanding in comparison with a professorship. At many universities, to get a doctorate, one must produce two or three papers that are either published or are, according to the dissertation committee, considered to be «publishable». The latter reduces the publication pressure. However, this seems to be a relatively recent development in German-speaking universities, as in the past, it was not typical for a doctoral student to publish but rather to use the dissertation as a basis for thereafter publishing in a journal. Thus, we derive the following hypothesis and expect substantial differences in perceived publication pressure depending on the career position.

Hypothesis 1: The subjectively felt publication pressure is highest among assistant professors without tenure, and lower for full professors and doctorates.

Our survey was available in both German and English. English speaking respondents to the survey are taken to come from academic systems outside the German-speaking universities. They are likely foreigners and dispose of a smaller local professional framework and fewer informal connections than German-speaking scholars. Therefore, they are assumed to have to rely more on publications than the locals.

It has been shown extensively that migrants face disadvantages in the German labor market, especially once the human capital characteristics are accounted for (Kalter & Granato, 2007). These disadvantages, e.g., reflected in a lower likelihood of being invited to an interview, are even documented for the second generation of immigrants for the German-speaking region (Zschirnt, 2020; Auer & Fossati, 2019). We assume a similar effect for academia as foreign academics have to outperform local scholars to obtain the same career trajectory. This should be reflected in a higher subjectively perceived publication pressure. We derive the following hypothesis:

Hypothesis 2: English-speaking survey respondents are subject to higher subjective publication pressure than local scholars.

Determinants of journal selection strategy

In view of the publication pressure, scholars may decide whether first to undertake research and thereafter choose where to submit the respective paper, or may first choose a professional journal in which to publish and adjust the research such as to maximize their publication prospect. In a moderate way, this can be interpreted as <game-playing> (Frey & Eichenberger, 1992, 1993), or in the extreme, this may be called <prostitution> (Frey, 2003). The publication requirement may lead to a crowding-out effect (Frey, 1997) by pushing out the intrinsic interest in engaging in research topics one finds relevant.

Hypothesis 3: The stronger the publication pressure, the more scholars first choose the journal in which they want to publish rather than intrinsically interesting research.

Discipline

The strong focus on publishing in German-speaking countries first started in economics and only later spilled over to business studies. It may well be that the subjectively felt publication pressure is still lower for business scholars, a reason being that they have more attractive opportunities outside academia than economists.

Hypothesis 4: *Economics scholars feel more publication pressure than scholars in business do.*

Resilience to rejected papers

As publications are crucial for an academic career, scholars must decide how often they resubmit a paper that has been rejected by a previous journal they submitted it to. We expect that economists are prepared to submit the paper more often than are business scholars. Economists are more focused on an academic career, while business students are aware that they have better outside opportunities.

Hypothesis 5: *Economics scholars resubmit a rejected paper more often than do scholars in business.*

The case of Excellence Universities

The Excellence Universities created in Germany by political fiat aspire to achieve a great international standing which heavily depends on publications as a metric. Therefore, scholars at Excellence Universities are expected to be under heavier pressure to publish than scholars at other German universities. A potential reason includes top-down pressure that is exerted from the political sphere to rectors, deans, professors and other academics. As the standing of an excellent institution is directly linked to higher monetary benefits and prestige, the stakes are high to retain the status.

Hypothesis 6: *Scholars at German Excellence Universities experience heavier publication pressure than scholars at other German universities.*

Furthermore, we investigate the effect of the exogenously assigned <Excellence> status on the other two dependent variables as well as hypotheses one to three. They are expected to be more pronounced in the case of Excellence Universities in comparison to the other German Universities. However, we refrain from formulating specific hypotheses as the existing literature does not offer enough guidance in this respect.

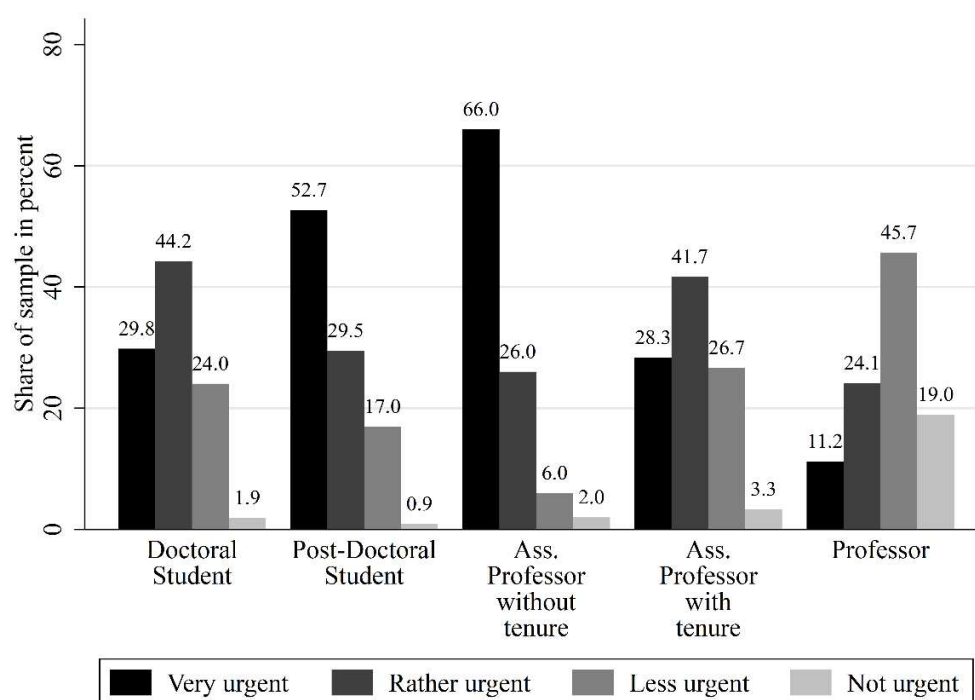
3.5 Results

Publication Pressure

This section provides an empirical analysis capturing the expressed subjective feeling of scholars ranging from doctoral students to full professors based on the extensive survey undertaken.

Figure 3.1 presents the data. Scholars in two positions, post-doctoral students and assistant professor without tenure, feel an urgent pressure to publish in academic journals. No less than 82% of the post-docs feel a <very urgent= or <urgent= pressure to publish. In the case of assistant professors who have not yet reached tenure, even 92% feel such urgent pressure. These are very high shares and strongly suggest that there exists intensive publication pressure for those scholars who start to engage in an academic career. This nowadays even applies to doctoral students. Three-quarters (74%) feel <very strong= or <strong= pressure to publish.

Figure 3.1 Publication pressure by academic positions



Publication pressure, not surprisingly, is lower once assistant professors have got tenure. More than one quarter (30%) feels their respective publication pressure to be <less urgent= or <not urgent=. Full professors feel a much lower pressure to publish in academic journals. 65% responded that they do not experience much pressure to publish; 19% even state that such activity is <not urgent= to them. As the figure shows, this is an exception compared to the scholars below the full professorial rank. Only six respondents in lower ranks indicated that they feel <no urgent= publication pressure.

Table 3.3 shows various potential determinants of the subjective publication pressure scaled from 1 (<not urgent=) to 4 (<very urgent=)6. The share of the variance attributed to the determinants is satisfactory as our study seeks to explain individual behavior (the adjusted R2 is somewhat more than 24%). The estimated coefficients indicate the pressure felt by various positions relative to professors. The effects of a successively higher academic position turn out to follow an inverted U-shape, which corresponds well to ex-ante expectations: The pressure increases from being a doctoral student and is highest for assistant professors without tenure. The latter are intensely aware that they can only get a position with tenure if they have published in recognized professional journals. Once having tenure, the subjectively felt pressure is reduced. These results are consistent with Hypothesis 1. The differences between the coefficients across positions are sizeable and statistically significant. They start with a size of 0.74 scale points for doctoral students, rise up to 1.3 for assistant professors without tenure, and are 0 for full professors.

⁶ The collected data on publication pressure are assumed to represent an interval scale.

Table 3.3 Determinants of subjectively felt publication pressure

	(1) Publication urgency	(2) Publication urgency	(3) Publication urgency	(4) Publication urgency
Doctoral Student	0.743 (7.64)	0.742 (7.62)	0.737 (7.57)	0.708 (7.08)
Post-Doc	1.063 (11.18)	1.063 (11.17)	1.060 (11.11)	1.018 (10.60)
Ass. Prof. without tenure	1.284 (11.13)	1.292 (11.12)	1.303 (11.14)	1.262 (10.95)
Ass. Prof. with tenure	0.674 (5.51)	0.672 (5.50)	0.689 (5.61)	0.666 (5.54)
Economics		-0.0523 (-0.74)	-0.0638 (-0.88)	-0.0825 (-1.15)
Austria			-0.0700 (-0.84)	-0.0793 (-0.95)
Switzerland			0.00237 (0.03)	-0.0571 (-0.62)
Male				-0.0932 (-1.18)
English respondent				0.354 (3.89)
Constant	2.276 (38.51)	2.303 (33.44)	2.335 (27.03)	2.372 (21.97)
Observations	558	558	558	558
Adjusted R^2	0.249	0.249	0.247	0.269

t statistics in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Publication urgency: 1 = Not urgent, 4 = Very urgent

Economics: 1 = Economics, 0 = Business

Austria: 1 = Austria; Switzerland: 1 = Switzerland

Male: 1 = Male; English respondent: 1 = English respondent

The additional potential determinants introduced in estimates (2) and (3) turn out not to be statistically significant, and their absolute sizes are small. The effects on subjective publication pressure are shown to be independent of whether a scholar is in economics or business studies or whether he or she works in Germany, Austria, or (German-speaking) Switzerland. Gender also does not have an effect on the level of subjectively felt publication pressure.

However, in regression (4), the variable <English respondent= is statistically significant. Scholars answering the survey in English come from outside German-speaking countries. They are more aware of the need to publish for an academic career, not least because they generally have fewer personal connections, which would be helpful to rise to a higher academic position. This result is consistent with Hypothesis 2.

The results are quite robust. The size of the estimated coefficients with respect to position changes little when additional determinants are added in equations (2), (3), and (4). A binary estimate (shown in the Appendix) in which the publication pressure is split into weak («not urgent» or «less urgent») and strong («urgent» or «very urgent») shows very similar results as do the estimates shown in Table III. It again reveals an inverted U-shaped subjectively felt publication pressure with a higher position. English-speaking respondents are again shown to be subject to additional publication pressure.

A potential interaction between academic position and discipline was investigated by calculating a separate regression with corresponding interaction terms. However, they were not statistically significant and were of low magnitude while controlling for language and gender.

Journal selection strategy

Scholars subject to varying degrees of publication pressure may respond in several different ways. A quite straightforward procedure is to first select a professional journal and adjust the research and its formulation accordingly, rather than proceeding in the traditional way of first engaging in a particular research topic and afterward selecting a journal assumed to be suitable. About 15% of the respondents of our survey first choose a journal quite in opposition to the traditional view suggesting that the research undertaken should be chosen independently of the publication issue. Strategic behavior is more prevalent in business studies (~21%) than in economics (~10%). The variable journal selection strategy is a dummy variable, where one represents the journal selection behavior and two the writing prioritization.

Figure 3.2 shows the responses by position. It shows that first engaging in research and choosing a journal later is still prominent among all academic scholars. Among full professors, 87%, and among assistant professors with tenure, 82% choose to first do the research and then to consider a publication outlet. It is nevertheless important to notice that among untenured assistant professors, almost one quarter (22%) first wish to find out what journal would be suitable to publish in and only thereafter focus on the corresponding research to be undertaken.

Figure 3.2 Journal selection strategy by academic position

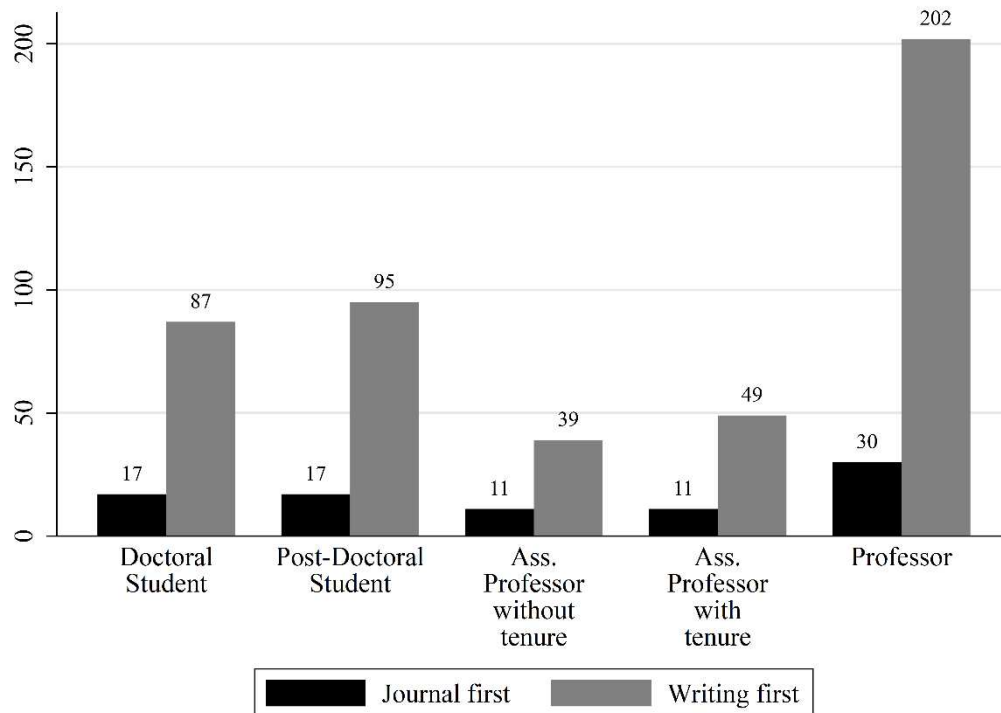


Table 3.4 inquires what the determinants of the publication strategy are. In contrast to our expectations, the extent of subjectively felt publication pressure does not seem to play a role. Hypothesis 3 is rejected; scholars feeling a higher publication pressure do not deviate more from their intrinsic research interests.

Economists employ the strategy of first choosing a journal less often than business economists. This result is not consistent with Hypothesis 4, rather the opposite is the case. This result is surprising as there is no statistical difference between disciplines concerning publication pressure, where Hypothesis 4 is also not consistent. Another statistically significant determinant is revealed for Austria (compared to Germany): Austrian economists are less inclined to first choose a journal and to then engage in the corresponding research. An interpretation of this result could possibly be that the answers to this item relate more to respondents' general views about norms of how to publish and less to the current circumstances of a particular academic.

Table 3.4 Determinants of journal selection strategy

	(1) Journal selection strategy	(2) Journal selection strategy	(3) Journal selection strategy	(4) Journal selection strategy	(5) Journal selection strategy
Urgent Publication	0.00186 (0.06)	-0.000822 (-0.03)	-0.000198 (-0.01)	-0.00105 (-0.03)	0.0256 (0.73)
Economics		0.118 (3.85)	0.117 (3.87)	0.108 (3.57)	0.113 (3.73)
Male			0.00611 (0.18)	-0.00218 (-0.07)	-0.00756 (-0.23)
Switzerland				-0.0299 (-0.81)	-0.0363 (-0.98)
Austria				-0.0804 (-2.32)	-0.0782 (-2.23)
Doctoral Student					-0.0498 (-1.15)
Post-Doc					-0.0363 (-0.80)
Ass. Prof. without tenure					-0.117 (-1.82)
Ass. Prof. with tenure					-0.0403 (-0.70)
Constant	0.845 (34.46)	0.786 (25.10)	0.781 (19.02)	0.832 (18.72)	0.849 (18.11)
Observations	558	558	558	558	558
Adjusted R^2	-0.002	0.023	0.021	0.027	0.027

t statistics in parentheses;

Journal selection strategy: 0 = Journal first, 1 = Writing first

Economics: 1 = Economics, 0 = Business

Austria: 1 = Austria; Switzerland: 1 = Switzerland

Male: 1 = Male; English respondent: 1 = English respondent

Resilience to rejected papers

Following Hypothesis 5, economics scholars are expected to be more resilient than are business scholars and resubmit a paper more often to a new journal. The responses regarding the submission cutoff, after which a respondent discontinues the publication effort are documented in Figure III. Some respondents opted to answer with something similar to <I never discontinue the publication effort=. Other respondents indicated extremely large numbers. However, this poses the challenge of choosing a numeric cutoff indicating the number of submissions deemed to represent that the publication effort is never discontinued. For the graphical illustration, the cutoff was set at 25 submissions. However, the average time frame of a paper that is submitted 25 times, including the associated time to reformat the manuscript according to a journal's specific requirements, exceeds any realistic expectation. Thus, for the regression analysis, we specified a more realistic cutoff at ten submissions as the maximum numeric value. In line with their position, assistant professors without tenure are prepared to submit their contributions to more journals after having been rejected before. The interpretation of the statistical results does not change when the limit is increased from 10 to 15, 20 or even 25 attempts.

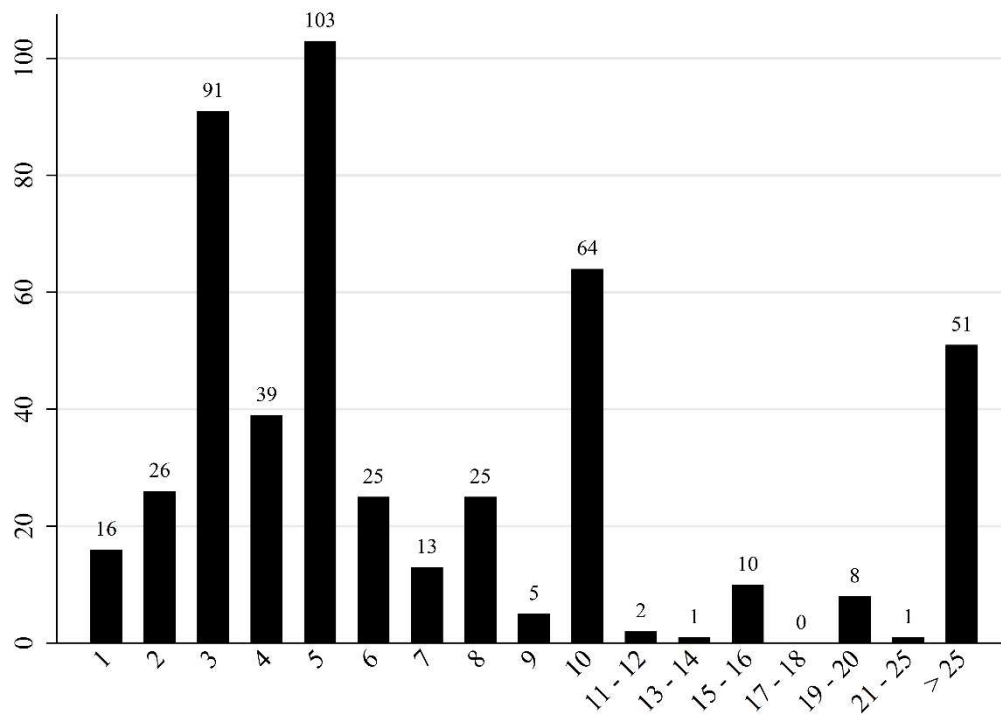
Excluding all entries with a numeric value above 25, the (lower bound) mean of the reported submissions' cutoff is 5.8 with a high standard deviation of 3.7. The median and mode for all observations lies at five. This means that on average, academics apparently are willing to submit their paper to five or six different journals before they give up. This can be interpreted from different perspectives. Firstly, the resilience to rejections is, on average, quite high, and academics are, for instance, aware of the journals' high rejection rates. At the same time, this implies that academics do not consider the generated effort on the other side in terms of effort and time of editors and reviewers. Whether this tendency can be sustainable over the long-term will have to be seen.

Figure 3.3 shows peaks at popular numbers (3, 5, 10, 15, 20). In general, this empirical phenomenon of reported rounded numbers reflects the participants' uncertainty regarding their own estimation's result (Schwarz and Oyserman, 2001). It indicates that respondents opted for a <close enough= estimation rather than an exact answer (Tourangeau et al., 2000). It might well be that participants of the survey (or academics in general) do not determine a specific cutoff for the number of submissions ex-ante. Therefore, the <close enough= estimations are reasonable and foreseeable.

Among the overly optimistic researchers, claiming they either never give up or give up only after 25+ submissions, professors and assistant professors without tenure are overrepresented compared to their sample share (49.0% vs. 41.6% resp. 11.8% vs. 9.0%). The other groups are underrepresented, doctoral students 11.8% vs. 18.6%, post-docs 17.6% vs. 20.0%, and assistant professors with tenure 9.8% vs. 10.8%. The cause for the gap may differ across groups. Giving up on a publication effort implies sunk costs for the researcher. Researchers in need of publication for the advancement of their career may be inclined to abandon a subjectively unsuccessful project in favor of a new, subjectively more promising project. Professors may less often seek publications to

further their career and importantly face less time pressure due to expiring contracts, hence they are less often willing to accept the sunk costs associated with giving up on a publication effort.

Figure 3.3 Distribution of responses of submission cutoff after which publication effort is discontinued



In our analysis, we focus on determinants that can explain differences in the submission-threshold after which the publication effort is discontinued. The results are shown in Table 3.5. According to the estimates, economists seem to be more resilient, i.e. they are prepared to more often resubmit a paper after a previous rejection than do researchers in business. Business scholars are, therefore, less willing to engage in the rather unpleasant exercise of pursuing further submissions. This result is consistent with Hypothesis 5.

Table 3.5. Giving up the publication effort (limit: 10)

	(1) Giving up publication efforts	(2) Giving up publication efforts	(3) Giving up publication efforts	(4) Giving up publication efforts
Economics	1.673 (6.63)	1.663 (6.56)	1.586 (6.19)	1.497 (5.88)
Male		0.171 (0.58)	0.147 (0.50)	0.138 (0.46)
Urgent Publication			0.243 (0.92)	0.0540 (0.18)
Switzerland			0.163 (0.49)	0.127 (0.38)
Austria			-0.370 (-1.27)	-0.567 (-1.93)
Doctoral Student				-0.532 (-1.39)
Post-Doc				0.244 (0.66)
Ass. Prof. without tenure				1.436 (3.03)
Ass. Prof. with tenure				0.754 (1.73)
Constant	5.674 (31.42)	5.559 (19.99)	5.576 (14.54)	5.672 (13.75)
Observations	558	558	558	558
Adjusted R^2	0.072	0.070	0.072	0.094

t statistics in parentheses;

Economics: 1 = Economics, 0 = Business

Austria: 1 = Austria; Switzerland: 1 = Switzerland

Male: 1 = Male; English respondent: 1 = English respondent

The case of German «Excellence Universities»

In Germany, the universities have been formally classified into top universities, called <Excellence Universities=, and all other universities. It could be thought that in Excellence Universities the subjective publication pressure is higher because these universities make a great effort to be internationally competitive ³ which today is strongly connected to the number of publications in top journals (Akerlof, 2020).

Table 3.6 Results for Excellence Universities in Germany

	(1) Publication urgency	(2) Journal selection strategy	(3) Giving up publication efforts
Doctoral Student	0.791 (4.68)	-0.0151 (-0.23)	-1.598 (-2.82)
Post-Doc	1.210 (7.17)	-0.00367 (-0.04)	-0.425 (-0.58)
Ass. Prof. without tenure	1.356 (5.78)	-0.0641 (-0.57)	-0.0677 (-0.07)
Ass. Prof. with tenure	0.458 (1.26)	-0.0576 (-0.33)	0.477 (0.50)
Economics	0.0464 (0.35)	0.0503 (0.98)	1.777*** (3.98)
Male	-0.124 (-0.81)	-0.00514 (-0.09)	0.876 (1.60)
English respondent	0.357* (2.34)	0.160 (4.25)	0.0749 (0.11)
Excellence university	-0.192 (-1.33)	-0.0327 (-0.56)	-0.0606 (-0.13)
Publication urgency		-0.0529 (-1.54)	0.351 (1.14)
Constant	2.348 (12.57)	2.010 (23.30)	4.465 (4.50)
Observations	176	176	176
Adjusted R^2	0.302	0.016	0.115

t statistics in parentheses,

Publication urgency: 1 = Not urgent, 4 = Very urgent

Economics: 1 = Economics, 0 = Business

Austria: 1 = Austria; Switzerland: 1 = Switzerland

Male: 1 = Male

English respondent: 1 = English respondent

DEU excellence: 1 = University of Excellence

However, the results are pretty similar to those for all German-speaking countries. Scholars at German Excellence Universities do not feel more burdened by the «publish or perish» need than scholars at other universities do. This result is not consistent with Hypothesis 6. The same holds for the journal submission strategy and the resilience to having papers rejected. These results suggest that administratively determined «Excellence» has no substantial impact on academia with respect to publications. This result is, in various respects, in line with a previous analysis studying the publication requirements for assistant and full professorships (Briviba & Frey, 2023).

3.6 Conclusion

The results of the econometric analysis of the survey among scholars in universities in Germany, Austria, and German-speaking Switzerland do not fully align with the ex-ante formulated theoretical hypotheses. Indeed, two of the six hypotheses are rejected. Our analysis reveals a heavy subjectively felt pressure to publish in scholarly journals. This pressure has often been commented on but has rarely been subjected to an extensive empirical analysis. The «publish or perish» imposition is stronger for economists than for business scholars, presumably because the latter have more attractive opportunities outside academia. They are, therefore, better able to avoid the utility-decreasing publication pressure. In contrast to what might be expected, the subjectively felt publication pressure does not induce scholars to deviate from what is considered good scientific practice, namely to first engage in research, and only afterward seek a publication outlet.

To the extent academic careers are based on a competition in which the best win, pressure to perform is unavoidable. However, to the extent other factors, such as being part of the right network, are decisive (as shown by Carrell et al., 2022), a publishing competition does not serve a useful function but lowers the utility of scholars. The academic sphere's output, especially in economics, tends to be almost exclusively determined by human capital and individuals' ideas. Physical capital plays only a subordinate role. Therefore, the quality of the output is fundamentally dependent on self-selection of clever and intrinsically motivated people with an ambition to improve society through academic research. Müller and Rijcke (2017, p. 166) note that «academic research becomes a less attractive workplace for individuals committed to societal relevance and the greater public good.» This development is particularly relevant for young persons considering whether to pursue a university career. If academia becomes, as the authors suggest, indeed less attractive to intrinsically motivated candidates, they potentially less often self-select into an academic career.

In addition, alternative mechanisms for academic career selection should be considered. One is to first determine what persons are, in principle, able to academically perform well. This evaluation should not be focused solely on publications in scholarly journals but also on the capability to teach well, to efficiently perform administrative duties within the university, and to communicate successfully with the public community (see e.g. Colander, 2014). Even a random selection among the persons considered capable might be considered (Osterloh & Frey, 2020). Such a procedure might

not only be more adequate for academia but may also reduce the pressure presently imposed on scholars ready to engage in an academic career.

An important aspect of publishing relates to the oligopolistic market. Even though there are a large number of scientific journals in economics, a few publishers dominate the offer. The development in social sciences over the past 20 years is blatant, as the largest five publishing houses' share of all papers increased from 15% in 1995 to 66% in 2013 (Larivière et al., 2015). Recently, there have been various attempts to break this oligopoly. Thus, more open access publications, new journals, and author-friendly review processes have been proposed and developed (e.g., Akst, 2010; Gerring & Pemstein, 2021). An online journal called <Seeds of Science= has just been created. Its reviewers do not - as is customary today - act as negative critics, but see themselves as <gardeners=, thus helping to improve a contribution. On the other hand, little attention is paid to the fact that the publication process could be reversed. The authors could offer an article to any number of journals, which then select the contributions they like best. This could take place through an institutionalized setting or via the journals' editorial board, which would gain relatively more importance. As such, the editorial board member suggesting a manuscript would have to emphasize the benefits and to defend it 3 again reversing the status quo in which the reviewers have a strong tendency to criticize rather than to provide constructive feedback. This procedure would also counter the increasing duration of the publication process as the competition between journals incentivizes swift actions. Especially young scholars suffer from temporary positions and their respective behavioral adaptations. Those strategic adaptations such as less risk-taking concerning topics and stronger orientation towards publication worth research would be weakened, benefiting the whole research community. However today, such an approach is inverse to the incentives of publishers to change to the overall benefit and completely contradicts what is considered <academic ethics=.

Appendix Chapter 3.

Figure C.3.4 Survey questions

1. After the initial formulation of your research question, which behaviour is more likely to apply to you?

- ☐ First, choice of a journal and then writing of a suitable paper.
- ☐ First, writing of the paper and the choice of a suitable journal.

Page 02
Journal

2. Regarding your most recently published paper: Please name the scientific journal of initial submission and the journal of publication:

Initial submission:

Journal of publication:

To how many journals did you submit the published paper in total? (Including initial submission and publishing journal).

Amount:

Page 03
LVLofJou

3. In general, what strategy do you choose when submitting a paper for the first time?

- ☐ Top 5 Journals
- ☐ Leading specialised journals
- ☐ Good general journals
- ☐ Lower rated journals

Page 04
Rev

4. Regarding your last published paper: How many times did you have to revise the paper before it was accepted? (Regarding the journal of publication)

Amount:

5. How many days did you work on the overall revision of your last published paper? (Regarding the journal of publication)

Days

Page 06
RevEffort

6. Estimate the effort of the revision process of your last publication in the following categories as a percentage:

Content adjustments: %

Methodological adjustments: %

Formatting: %

Sum 0 %

Page 07
AccDec

7. Did you ever experience that one of your papers was rejected after you implemented the first revision?

[Please choose] ▼

Page 08
GvUp

8. After how many submissions of the same paper do you abandon the publication effort?

Amount of journals:

Would you please provide us with the following information.

Which position do you hold at your university?

- ☐ Doctoral student
- ☐ Post-Doctoral student
- ☐ Assistant professor without tenure track
- ☐ Assistant professor with tenure track
- ☐ Professor
- ☐ your position

What is your gender?

- ☐ Female
- ☐ Male
- ☐ No answer

How would you rate the urgency of publishing in a scientific journal at the moment?

- ☐ Very urgent
- ☐ Rather urgent
- ☐ Rather not urgent
- ☐ Not urgent at all

What is the name of your university?

Your answers are anonymous and will be used exclusively for research purposes.

Chapter 4. Behind the Curtains of Academic Publishing: Strategic Responses of Economists and Business Scholars*

Abstract

Bibliometric measurements are becoming omnipresent and crucially important for academic career decisions. The measured criteria induce strong incentives to align academics' time and efforts. Based on a survey of economics and business scholars in German-speaking countries, this chapter empirically explores the interactions between scientific journal metrics and the behavior of authors in the publishing process. The impact different types of pressure have on their decisions is emphasized. In line with rational choice, authors generally move down in journal ranking as they resubmit their papers. While random elements highly influence the process, the Scimago journal rank provides the best fit to researcher's behavior. Doctoral students initially submit to lower ranked journals compared to higher academic positions, which is likely due to the time pressure they face. The empirical findings improve our understanding of strategic responses in the scientific publishing process induced by the institutional change of research evaluation. Qualified lotteries, along with other propositions to balance the weight attributed to metrics, are suggested to mitigate adverse responses by academics.

4.1 Introduction

Bibliometrics has become an omnipresent aspect of academic life. It is used to assess the impact or quality of individual papers, researchers, scientific journals, and academic institutions. Before the widespread use of databases collecting citations, peer-review was the only formal method by which the quality of research could be evaluated. Bibliometrics represents an easily available tool consuming little time and effort. While peer-review is still crucial in mutually evaluating researchers' products, bibliometrics has become essential for the advancement of academic careers. Since science is highly competitive, high-scoring academics are induced to display their scores, further legitimizing the importance of bibliometrics (Wouters, 2014). Pressure to perform well on these scores already burden junior academics (manifesting e.g., in students experiencing mental health problems, see Evans et al., 2018), for whom doctoral dissertations in the form of several journal articles rather than one monographic work have become the rule. Before 2016, cumulative dissertations consisting of a number of

* This is collaborative work together with Bruno S. Frey and Fabian Scheidegger and has been published in the Journal Scientometrics, (Scheidegger et al., 2023).

stand-alone articles intended for peer-review stood at 34% for law, economics, and social science. For the cohort in 2019/2020, the number has increased to 40%⁷. Academics who do not yet hold an assistant professorship with tenure face even stronger incentives to obtain high bibliometric scores, as their career crucially depends on publications in top journals (Akerlof, 2020; Heckman & Moktan, 2020; Osterloh & Frey, 2020).

Since publications are now the hard currency for an academic career, the type and degree of publication pressure should significantly impact publication behavior. This is best illustrated by those researchers with the least experience: Doctoral students. When they start their academic journey, they may be familiar with the publication requirements but, often, are unfamiliar with the publication process. Countless experiences of ex-PhD's can be found online in the form of blog posts or articles. *Nature* picked up on many negative consequences of publication pressure and discussed them in the focus named *PHDs under publication pressure in nature human behavior*⁸. Overall, pressure is argued to lead to a prioritization of quantity over quality. Doctoral students with publication pressure are discouraged from pursuing projects that are deemed to have a low probability of publication. This includes time-intensive projects (Kiai, 2019) such as interdisciplinary (Collyer, 2019) or replication (Stoevenbelt, 2019) projects as well as innovative (Dietze et al., 2019) or regional and non-western focused (Mulimani, 2019) projects. When pressure mounts high, unethical behavior is incentivized. Past doctoral students argue that pressure incentivizes p-hacking to avoid null-results (Head et al., 2015), HARKing to make hypotheses fit the results (Kerr, 1998), slicing work into multiple smaller publishable parts (Neill, 2008), convoluting the cumulative dissertation with co-authorship work and exploiting freedom in data-collection and analysis (Hobson, 2019; Kiai, 2019; Moradi, 2019; Yeung, 2019). In recent years it has even become more common to see publications featuring shared first authorship (Hu, 2009; Lapidow & Scudder, 2019). This is especially the case for PhD students, who have to comply with first authorship requirements. Competition among peers discourages researchers in general from sharing their research ideas (Landgrave, 2019). Focusing on article production also devalues other important skills, such as teaching and mentoring, research communication, or skills more suited for work in the private sector. All those reasons contribute to degrading work satisfaction during the PhD. Doctoral students are six times as likely to experience depression or anxiety compared to the general population (Evans et al., 2018). Worst case, when facing failure to publish, doctoral students may even quit academia (Wu et al., 2019). These problems are partly or entirely connected to publication pressure, and it is at least questionable, whether the current system promotes proper self-selection. Compared to other starting positions, young people entering academia often have inaccurate expectations of their new job (Ganguli et al., 2022). Being familiar with the publication process is thus a stressor particular to

⁷ See <https://www.nacaps-datenportal.de/indikatoren/C1.html>.

⁸ The majority of the following sources are published in the focus issue *PHDs under publication pressure in nature human behavior*. Mostly, they represent viewpoints and logical arguments based on personal experiences. However, many of the raised concerns find empirical support in the scientific literature discussed in section 4.2.

junior scientists.

Our paper aims to describe how researchers in economics and business navigate through the publication process. In a survey of academics in Germany, Austria, and the German-speaking part of Switzerland, we collected data on the initial submission to a journal and the final publication of the last successful publication effort. Per respondent we therefore obtain the initial submission journal and the publication journal of the most recent publication. This data enables us to analyze and compare strategic behavior of academics with different academic positions and levels of publication pressure. The study focuses on strategic behavior with respect to the ranking of the respective journal. Our analysis in particular highlights how behavior between junior and senior scientists differs. The generated insights contribute to the continuing discussion of better practices in design of doctoral studies, strategic responses of academics, and publishing behavior in general.

In the following section 4.2, developments in bibliometrics and a literature review of the interaction between rankings and author behavior are provided. In section 4.3, the hypotheses underlying our analysis are derived. Section 4.4 provides a summary of the data, including a description of the survey data as well as the peculiarities associated with using rankings based on bibliometrics. Section 4.5 discusses the methodological approaches used to obtain the estimation results. These are shown and discussed in section 4.6. Section 4.7 discusses proposals to improve the circumstances for young academics and publication strategies in general, while section 4.8 concludes.

4.2 Literature Review

There exist numerous approaches aiming at measuring the impact of research. As simple measures are often subject to methodological and practical critique, ever more complex metrics have been introduced (Mingers & Leydesdorff, 2015). An illustrative example of the trend is provided by the h-index, which addresses flaws in using citation counts or impact factors. The h-value is represented by the number h of papers of a researcher that have at least h citations. It adds an additional element instead of the one-dimensional citation count or impact-factor but is at the same time more complex to define. Most research output nowadays is consumed online. It has become important to measure online activity, such as the number of clicks, time spent on websites (which approximates the extent of reads), or online reactions. While these measures are not used in the analysis in the present paper, they imply similar incentive dynamics to academics as those used in our analysis. As online-metrics gain popularity and importance, rational researchers aim to boost and display their performance captured by such metrics. Because of their simplicity, the impact factor and h-index remain widely used among researchers in economics and business. Governing bodies base their decisions about grants and promotions heavily on these metrics. Hence, when researchers adjust their behavior because of citation metrics, these metrics are most likely to be on their minds.

While measurements are introduced to satisfy the demand for accountability and transparency, they can also have unintended consequences. Espeland & Sauder (2007) use the term reactivity to describe the phenomenon of people changing their behavior in

response to being observed or measured. A vast literature exists showing the implications of incentives with respect to the use of rankings and scientometrics. An overview is provided in Binswanger (2015). As metrics in science have become important, researchers are inclined to cite and choose topics strategically (Horrobin, 1996; Frey, 2003), such as maximizing publications per research idea (Weingart, 2005) and increasing the number of co-authors per manuscript (Card & della Vigna, 2013; Hamermesh, 2013; Wuchty et al., 2007). The literature provides substantial support that rankings produce self-fulfilling prophecies (Espeland & Sauder, 2007; Osterloh & Frey, 2020). Empirical literature on the reaction of researchers to bibliometrics is smaller. In contrast to this study, data is less often collected by directly surveying scholars, but getting data from public databases. Michels & Schmoch (2014) find that to attain higher citation rates, researchers shifted submissions from specialized to broader journals and journals based in the United States with high impact factors. Some case studies analyze the impact of research evaluation programs in different countries. Many authors are concerned that research rankings homogenize research output and displace heterodox approaches (Bloch, 2010; Corsi et al., 2010; Mingers & Willmott, 2013; Aistleitner et al., 2018). Butler (2003) documents that researchers increased their publication activity, but in lower impact journals as a response to how the research evaluation policy has been undertaken in Australia. The measurements used appear to have changed the publication habits of researchers at the two universities analyzed. For the United Kingdom's Research Assessment Evaluation waves Moed (2008) finds, when evaluation is focused on citation counts, researchers increase article production, and when evaluation focuses on quality rather than quantity, researchers increase articles in high-impact journals.

The existing literature focuses on the observable published work of researchers. The number of authors on a paper, networks of authors, or the evolution of publication output or outlets is obtainable in databases. Some only require counting the authors on a publication, others like network analysis require more complex methods. Our survey and analysis contribute to the literature, because data on the journal of initial submission and the number of submissions of the most recent successful publication effort was collected. This data cannot be obtained through public databases, but solely by surveying authors individually and hence was hidden behind the curtains of academic publishing.

4.3 Hypotheses

This section presents and motivates the hypotheses tested in the analysis. We aim to analyze to what quality (ranking) of journals, economics, and business researchers initially submit to, ultimately publish in, the number of submissions in between those two actions, and to what degree publication pressure influences these outcomes.

The researchers in our sample are assumed to behave according to the rational choice approach, in our case, by maximizing their career opportunities. They do that by aiming at the highest-ranked publication outlet possible, depending on the subjectively assessed quality of their manuscript and subjectively felt types of pressure, including time constraints. For some researchers, this assumption may be stronger than for others.

There certainly exist several idealist researchers not willing to engage in careerism, especially among more senior researchers who enjoy high job security. However, academics from doctoral students up to assistant professors without tenure are required to publish, preferably in top journals, to ensure a successful academic career. While assistant professors with tenure and full professors enjoy high job security, to rise to the top or be of interest to more prestigious employers, they still need to publish in top journals.

When researchers initially submit their manuscript, they assess its quality and then submit it to the highest ranked journal with a reasonably high probability of having it accepted. If the paper is rejected, they are assumed to re-assess the quality of their paper and consider lower ranked journals for the next submission. We define the *ranking difference* as follows:

$$\text{Ranking Difference} = \text{Ranking}_{\text{Initial Journal}} - \text{Ranking}_{\text{Publication Journal}}$$

capturing the difference in the respective ranking between the journal of publication and the journal of initial submission. The logic outlined above implies that researchers subsequently choose lower-ranked journals when their paper was rejected. The more often a researcher has submitted a manuscript, the larger we expect the *ranking difference* to be.

Hypothesis 1: As the number of submissions increases, the ranking difference between the publication journal and the journal of initial submission is expected to increase.

We define two types of pressure: time- and quality pressure. The former describes that a researcher needs to produce a certain number of publications in a given time window, irrespective of the pedigree of the journals in which they are published. The latter represents the need to produce publications in high-quality journals. While most academics face a combination of the two types, the dominant type of pressure depends on the academic position. What type of pressure is more important has implications for publishing behavior. When facing only time pressure, researchers may submit to lower ranked journals initially. If rejected, they tend to move down more quickly in terms of ranks for the next submissions. On the other hand, if only top publications are required, researchers need to initially submit to a top-journal and, after rejection, try again in other top journals, which is associated with a small ranking difference from the initial submission.

Doctoral students usually face a limited time frame during which they are required to produce either a certain number of publications or manuscripts worthy of publication. For them, top publications are less relevant for the advancement of their careers and thus, they mainly face time pressure. Post-doctoral students already have a higher probability of pursuing a professorial position and thus ought to face more quality pressure than doctoral students. It is, however, difficult to assess, what type of pressure is dominant in this group. On the other hand, assistant professors without tenure mainly face quality pressure. Their probability of getting tenure crucially depends on top publications (Heckman & Moktan, 2020). Lastly, assistant professors with tenure and full

professors face a generally lower degree of pressure than the other groups, consisting mainly of quality pressure. Based on these considerations, the following hypotheses will be tested:

Hypothesis 2: For doctoral students time-pressure dominates.

- a) They are expected to submit to lower ranked journals initially compared to researchers in a more advanced academic position for which quality pressure dominates.
- b) The change in ranking per submission from the initial to the publishing journal is expected to be larger than for academics facing mostly quality-pressure.

Hypothesis 3: Assistant professors without tenure face the highest degree of quality pressure.

- c) They are expected to initially submit to higher-ranked journals compared to all other academics.
- d) The change in ranking per submission from the initial to the journal they finally publish in is expected to be smaller than for all other academic positions.

Hypothesis 4: Assistant professors with tenure and full professors face less quality pressure than assistant professors without tenure and have only little time pressure.

- a) They are expected to initially submit to higher-ranked journals than doctoral students.
- b) The change in ranking per submission from initial to publishing journal is expected to be smaller than it is for doctoral students.

4.4 Data

This section shortly describes the survey used for our analysis, identifies the relevant variables, and describes the journal ranking data used.

4.4.1 Survey

Our analysis is based on a survey among business and economics scholars in Germany, Austria, and the German-speaking part of Switzerland, carried out between October and November 2021. In total, 26 universities were sampled, and 558 valid observations obtained⁹. An overview of the characteristics of the responses is provided in Tables 1 and 2.

Table 4.1 Description of the sample of responding researchers.

		Gender			Discipline	
Country	N	Females	Males	No answer	Business	Economics
<i>Responded</i>						
Total	558	157	394	7	270	288
	(100.00)	(28.14)	(70.61)	(1.25)	(48.39)	(51.61)
Austria	224	79	143	2	130	94
	(100.00)	(35.27)	(63.84)	(0.89)	(58.04)	(41.96)
Switzerland	134	31	101	2	52	82
	(100.00)	(23.13)	(75.37)	(1.49)	(38.81)	(61.19)
Germany	200	47	150	3	88	112
	(100.00)	(23.50)	(75.00)	(1.50)	(44.00)	(56.00)

Table 4.2. Academic positions among valid responses. Percentages of total are reported in parentheses.

Country	N	Doctoral Student	Post-Doctoral Student	Ass. Prof. without tenure	Ass. Prof. with tenure	Professor
Total	558	104	112	50	60	232
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Austria	224	33	38	26	38	89
	(40.14)	(31.73)	(33.93)	(52.00)	(63.33)	(38.36)
Switzerland	134	21	35	6	14	58
	(24.01)	(20.19)	(31.25)	(12.00)	(23.33)	(25.00)
Germany	200	50	39	18	8	85
	(35.84)	(48.08)	(34.82)	(36.00)	(13.33)	(36.64)

⁹ A more detailed description of the survey can be found in the working paper Briviba et. al. (2023).

4.4.2 Variables

The following variables are used in our analysis:

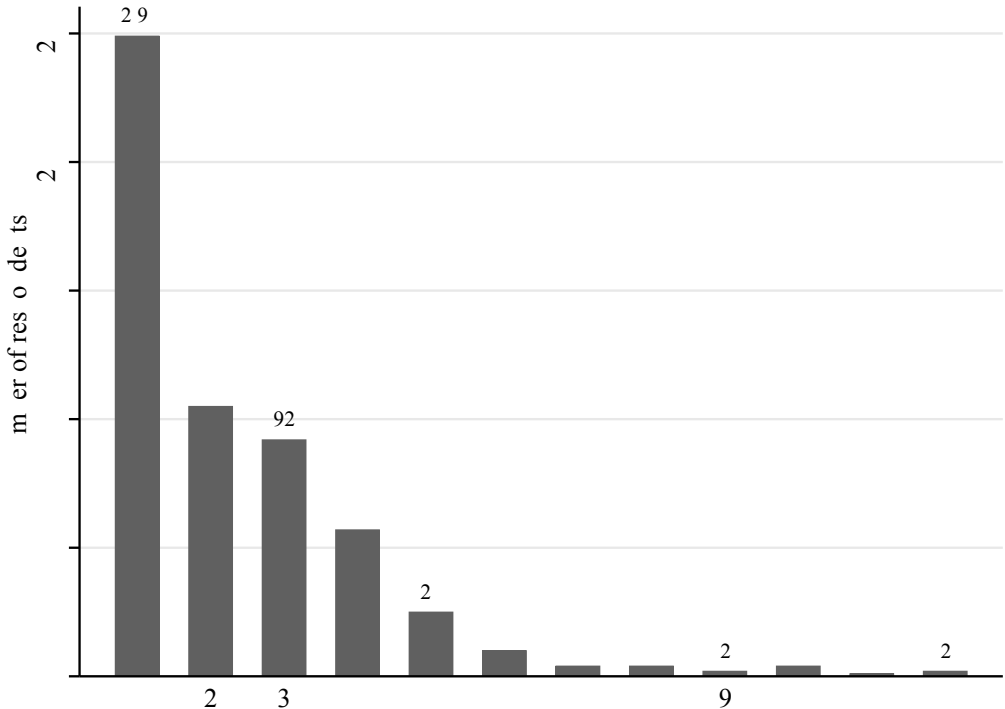
- *Initial and publication journal ranking*: The ranking of the journal of initial submission and journal of publication for the most recent successful publication of each respondent.
- *Number of submissions*: The number of submissions for this publication effort (including the initial and publishing submission)¹⁰.
- *Ranking difference and ranking difference per submission*: The difference in the respective ranking as described in the previous section and the same number divided by the number of submissions, respectively.
- *Journal strategy*: The preference for either first writing a manuscript and thereafter choosing a suited journal, or first choosing a journal and then writing a suitable manuscript (opportunism).
- *Journal Category*: The preference for what category of journals initially to submit to. The survey covered four categories, which were decoded into two categories. One covering top and leading journals, the other containing lower ranked journals.
- *Publication pressure*: Subjectively felt publication pressure reported by the respondents.
- Other information on the respondent: Gender (Male), discipline (Economics), respondents who filled out the survey in English and therefore are assumed to be foreign academics (English), and the academic position (Doctoral student, Post-Doc, Ass. Professor without tenure, Ass. Professor with tenure, Professor).

For each respondent, data on the most recent successful publication effort was collected. Ideally, a survey should aim at obtaining as many publication efforts per researcher as possible to obtain publishing behavior representative of that researcher. However, asking for more publication efforts would come at the expense of accuracy, bias of responses, and a lower response rate. There are substantial challenges if respondents have to recollect publications that are well in the past. Since the whole publication process can reach an extensive duration, an accurate recollection of each step is unlikely (Huisman & Smits, 2017). More importantly, researchers are more likely to remember memorable publication efforts, such as top publications or dissatisfying review processes, which would bias the sample. By asking for the most recent publication, essentially a random publication was surveyed for each researcher, which should yield a representative sample per academic position.

¹⁰ A small number of respondents stated that their number of submissions was zero and responded with the same initial and publishing journal. These answers imply that the number of submissions ought to be one. This correction was applied to these cases.

The distribution of the number of submissions before publication is given in Figure 4.1. Anyone responding to have only submitted once must necessarily have been successful with their initial submission. Thus, the figure shows that a large share of respondents was successful with their initial publication attempt. Since we are interested in strategic behavior after rejection, the main analysis focuses on the remaining ~55% of the persons who had to choose a new publication outlet after rejections. Of the remaining sample, most respondents have submitted between two and five times in total. Only 27 scholars had to submit their last successful paper more than five times.

Figure 4.1 Distribution of number of submissions



4.4.3 Journal Ranking Data

Journal ranking data was obtained through the Scimago website. The data were merged to the survey data, by adjusting reported journal names in the survey data, such that they matched the names in the Scimago data. We matched the survey data to the Scimago journal ranking (SJR) including all subject areas, thereby allowing for economics and business scholars to have submitted to journals in other research areas. Most submissions in our sample, however, were to journals in economics and business. When journal rankings across different disciplines are analyzed, the rankings are sometimes adjusted to account for differing citing behavior. We chose not to adjust our rankings, as business and economics are reasonably close disciplines, and respondents in our sample

of one discipline often submitted to journals of the other discipline. Additionally, many economics journals are also listed in the business SJR-list and vice-versa. Some survey respondents submitted or published to journals that were not in the Scimago list. As the survey included many German speakers, the journals not included on Scimago were mostly lesser-known German journals. There is no ranking data available for these journals, and they are thus excluded from the analysis¹¹. The SJR-ranking, three-year impact factor (3y IF) and the Hirsch-Index (h-Index) are used for the analysis.

The impact factor is obtained by dividing the number of citations published works in a scientific journal received by the total number of published works in that journal over a given time frame. It is widely used among scientists, as its ranking fits the structure of high relevance journals relatively well, and it is easy to compute (Garfield, 2006). However, it has also been vastly criticized, as it does not consider the importance of citing outlets and self-citations and is not well suited for comparing disciplines with different citing practices (Kurmis, 2003; Postma, 2007). The h-index for a journal represents the number of articles that amassed at least h citations over a given time frame. We obtained the data through Scopus, where the time frame is set at three years. The h-index for scientific journals deemphasizes the value of individual highly cited works and in turn emphasizes journals that consistently put out highly cited articles (Bornmann & Daniel, 2007). The SCImago journal rank is a measure based on citations, but the rank is adjusted based on the prestige of the citing source. It has been recommended as an alternative to impact factors (Falagas et al., 2008), even though it is not as popular as the impact factor or the h-index. Researchers are most likely to adjust their behavior with respect to the metrics that they are familiar with, which explains the metrics chosen for this exercise. The SJR-ranking is chosen as the primary focus, as it represents an improved fit to the relevant journals in a discipline. Since the SJR accounts for both citations and importance of the citing source, it is positively correlated with both the three-year impact factor and the h-index. In Table 4.3 the correlations between the SJR and the other metrics are provided, for economics and business separately. In the upper regions of the SJR, correlation with the impact factor is higher. The fact that this is reflected in our sample indicates that, the SJR is legitimate choice for analysis. Initial submissions in our sample are more often to higher ranked journals, which is indicated in the table. The correlation of the SJR with the three-year impact factor in economics is lower among the publication journals than among initial submissions. We argue that business and economics allow a meaningful comparison as the disciplines are close to each other.

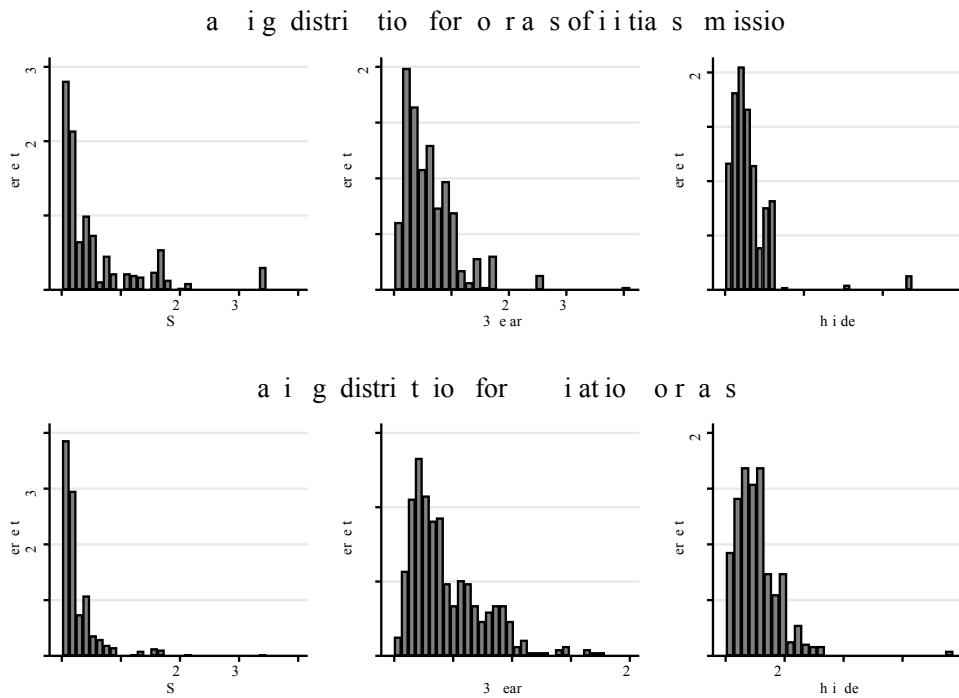
¹¹ The excluded observations mainly submitted to smaller, unknown journals, which would rank in the bottom proportion of the rankings used. Were it possible to include observations in the analysis, they would lend additional support to the results obtained.

Table 4.3 Correlations between SJR, three-year impact factor and h-index.

	All journals		All journals with SJR > 0.5		Sample journals of initial submission		Sample journals of publication	
	3-year IF	h-index	3-year IF	h-index	3-year IF	h-index	3-year IF	h-index
Economics	0.42	0.71	0.65	0.66	0.65	0.41	0.52	0.4
Business	0.63	0.75	0.61	0.67	0.60	0.72	0.59	0.48

Journal ranking data are heavily skewed. Few journals obtain a very high score and are associated with large ranking gaps to the median journal. The journals in the neighborhood of the median journal will be very close in terms of ranking to the median journal. Figure 4.2 shows the strongly skewed distribution of the ranking data in our sample (In addition, Figure C.4.3 in the Appendix displays the distribution of the ranking difference variable).

Figure 4.2 Distribution of ranking data



For all rankings, most submissions were to lower ranked journals. Submissions to the best ranked journals seem to occur somewhat more often when the submission was to the initial journal rather than to the publishing journal. The next subsection covers how the skewness of the data is addressed in the analysis.

4.4.4 Methodology

An ordinary least squares regression strategy was chosen for the analysis. Since the journal ranking data are skewed, the data is log-transformed whenever possible. The ranking difference variables span over positive and negative values and can therefore not be log-transformed in a meaningful way. Skewness in this case, is due to the few journals with very large ranking scores. By including the ranking score of the journal of initial submission as a regressor, we can control for this skewness.

4.5 Results

Table 4.4 presents the results of the regression of the number of submissions on the ranking difference. Since we are interested in the choice of journals after rejection, observations implying a successful initial submission (and therefore a ranking difference of zero) were excluded from this analysis. As described in the data section, the skewness of the ranking data automatically leads to large ranking differences whenever the journal of initial submission has a relatively high rank. Not controlling for the rank of the journal of initial submission distorts the coefficient relating to the number of submissions. This model would imply that a researcher moves down 1.53 SJR-ranking points with each submission. When controlling for the rank of the initial journal, the model implies that researchers choose a journal that is ranked 0.32 SJR-points lower than the previous journal with each additional submission. The typical respondent in our sample initially submitted to a journal with 2.44 SJR-ranking points, corresponding to the 134th rank on a compiled list of economics and business journals. They would then typically be declined once, after which they would choose a journal with an SJR of 2.13, which would be ranked 160th on the same list.

These results are in line with hypothesis 1: Academics who were rejected initially, on average, resubmit to lower-ranked journals. This is an implication of researchers interpreting being declined by a journal as a signal to adjust their own subjective evaluation of the paper downwards. They seem to deem the probability of acceptance larger, the lower a scientific journal is ranked.

Table 4.4 Number of submissions and ranking difference

	Ranking difference	Ranking difference
Number of submissions	-1.534 (-7.16)	-0.316 (-3.34)
Initial journal ranking		-0.784 (-34.41)
Intercept	0.0811 (0.09)	2.142 (5.84)
<i>N</i>	240	240
<i>R</i> ²	0.177	0.863
adj. <i>R</i> ²	0.174	0.862

In the following regression tables, t-statistics are provided in parentheses

The determinants for the ranking of the journal of initial submission are described in Table 4.5. As the distribution of the ranking scores are highly skewed, the response was log-transformed. Here the regression with doctoral students as reference group is displayed, since only this group exhibits significant differences compared to the other academic positions. The coefficients imply that all other academics initially submit to higher-ranked journals than doctoral students. Professors, on average, submit to journals that are ranked 35% higher than those of doctoral students. However, the effect is non-significant at the five percent level. Journals chosen by assistant professors with tenure are estimated to be ranked 75% higher than those chosen by doctoral students. Post-docs and assistant professors without tenure both submit to 55% more highly ranked journals than do doctoral students initially. In our sample the typical doctoral student initially submits to the 266th ranked journal on a combined list of economics and business journals. The regression then implies that assistant professors with tenure submit 136 ranks higher than doctoral students initially. The results are in line with hypotheses 2a and 4a, that doctoral students who face mainly time pressure, submit to lower ranked journals initially compared to other academics. The results also indicate that assistant professors without tenure choose more highly ranked journals for their initial submission. The estimated coefficients imply that they also choose better ranked journals than post-docs and professors. But these coefficients are associated with a larger p-value. Contrary to hypothesis 3a, the coefficient comparing assistant professors with and without tenure implies that those with tenure aim for slightly better ranked journals. This could be due to remaining habits from their time without tenure, ambition, or the smaller sample size for assistant professors. Overall, hypothesis 3a is weakly supported by our results. Concerning other control variables, we find that economists initially submit about twice as high compared to business scholars. This is indeed surprising, since both disciplines usually are part of one faculty and many journals are listed in both disciplines. According to Fabel et al. (2008), their close relationship in the German speaking region supports a

similar standard when evaluating research performance. However, there are non-neglectable differences in customs and implicit norms regarding the publishing process. Specifically, the top journals in economics are generally higher ranked than those in business and could thus provide an explanation for why economists initially submit higher. Further potential explanations may be that in the economics discipline journal publications are relatively more important, or that business scholars publish more in local journals. The preferred journal quality categories for initial submission are strongly correlated with the ranking of the journal of initial submission. Opportunism, the level of pressure, male respondents and English respondents yield small and statistically non-significant coefficients. Country effects were not included in this analysis, because in combination with academic positions, they result in reference groups that are too small. When studying country effects but omitting the academic positions, the results indicate that Swiss researchers initially submit to higher ranked journals than German scholars, which in turn submit to higher ranked journals than Austrian academics. This aligns with findings by Fabel et al. (2008) about country differences in research productivity. The fact that, apart from the academic position, none of the other individual characteristics have a statistically significant impact, indicates the potential for improvement on the institutional level.

Table 4.5 Determinants of initial journal ranking

	Doctoral student
Journal strategy	0.0145 (0.10)
Journal category	0.405 (2.58)
Publication pressure	-0.0295 (-0.43)
Economics	0.546 (4.89)
Male	0.117 (0.96)
English	0.202 (1.56)
Post-Doc	0.466 (2.62)
Ass. professor without tenure	0.562 (2.61)
Ass. professor with tenure	0.757 (3.61)
Professor	0.443 (2.66)
Intercept	-0.0581 (-0.18)
<i>N</i>	463
<i>R</i> ²	0.105
adj. <i>R</i> ²	0.085

Table 4.6 shows determinants of the ranking score of the publication journal. The score is again log-transformed. The table displays results for doctoral students and post-doctoral students as reference group only, as they are the only groups with significant differences compared to the other academic positions. Compared to post-doctoral students and assistant professors without tenure, doctoral students generally publish in journals ranked 27% and 36% lower, respectively, the associated coefficients are not statistically significant. Statistical significance is observed for Professors, who publish in journals ranked 42% higher and assistant professors with tenure, who even publish 79% higher than doctoral students. Further, assistant professors with tenure also publish in journals having a 39% higher SJR-score than post-doctoral students. The ranking of the publishing journal of the remaining academics is estimated as slightly higher than post-doctoral researchers with a low degree of statistical confidence. The preferred journal category for initial submission (a dummy variable with 1 capturing a preference for higher tiered journals) is strongly correlated with the publishing journal as well. Economists still generally publish in higher-rated journals than business scholars. However, while the initial submission is to a journal rated about twice as high compared to business scholars, the publication outlet is, on average, ranked only 22% higher. This result is particularly interesting as it hints at the importance of the Top 5 in economics in contrast with 22 A+ journals in business. The remaining controls are of low magnitude and statistical confidence. When country differences are investigated, the coefficients still indicate that academics in Switzerland submit to higher-ranked journals than academics from Germany and Austria. The estimated coefficients are, however, not statistically significant, hinting at unobserved influences of random elements among others in the publication process.

Table 4.6 Determinants of publishing journal ranking

	Doctoral student	Post-Doc
Journal strategy	0.179 (1.48)	0.179 (1.48)
Journal category	0.299 (2.42)	0.299 (2.42)
Publication pressure	0.0878 (1.62)	0.0878 (1.62)
Economics	0.0946 (1.06)	0.0946 (1.06)
Male	0.156 (1.62)	0.156 (1.62)
English	0.0392 (0.38)	0.0392 (0.38)
Doctoral student		-0.293 (-2.05)
Post-Doc	0.293 (2.05)	
Ass. professor without tenure	0.394 (2.25)	0.101 (0.61)
Ass. professor with tenure	0.747 (4.47)	0.454 (2.87)
Professor	0.476 (3.51)	0.183 (1.45)
Intercept	-0.706 (-2.83)	-0.413 (-1.59)
<i>N</i>	474	474
<i>R</i> ²	0.080	0.080
adj. <i>R</i> ²	0.060	0.060

The determinants of the ranking difference per submission are explored in Table 4.7. We hypothesize that scholars mainly under time pressure will have a larger ranking difference per submission than scholars mainly under quality pressure. However, scholars in different academic positions do not differ substantially regarding the gaps between two subsequent journals. The only weakly statistically significant effect is estimated for assistant professors without tenure compared to post-doctoral students. The former's SJR-ranking difference per submission is therefore 0.54 points larger than that of post-doctoral students. Since the ranking difference is defined as the ranking of the publishing journal minus the ranking of the initial journal, a positive coefficient means that assistant professors without tenure choose journals that are closer in ranking to the previous journal compared to post-doctoral students. The coefficients with respect to the other positions are statistically non-significant at the 5% level but all have the expected sign. The results, therefore, provide weak support for assistant professors without tenure facing mainly quality pressure and thus only moving down in ranking in small steps as they resubmit. However, our data does not support the hypothesis that doctoral students move down in ranking faster than assistant professors with tenure. In fact, the two groups barely differ in movement through journal rankings.

As a robustness check, the difference in submission behavior regarding the ranking difference per submission among the two disciplines was examined. Overall, the results are inconclusive, but tend to indicate that economists move down in ranking steps faster than business scholars. Additionally, the researcher's country did not influence the extent of ranking difference per submission between the initial and publishing journal significantly.

Table 4.7 Determinants of ranking difference per submission

	Ass. professor without tenure
Initial journal ranking	-0.185 (-20.63)
Journal strategy	0.216 (1.07)
Journal category	0.102 (0.48)
Publication pressure	0.0891 (0.96)
Male	0.154 (0.93)
English	-0.253 (-1.41)
Doctoral student	-0.312 (-1.05)
Post-Doc	-0.541 (-2.08)
Ass. professor with tenure	-0.402 (-1.28)
Professor	-0.202 (-0.73)
Intercept	-0.260 (-0.56)
<i>N</i>	240
<i>R</i> ²	0.666
adj. <i>R</i> ²	0.651

4.6 Robustness

To investigate the robustness of the results, we conducted the same analyses with two other journal metrics: The three-year impact factor and the h-index. As described in section IV, the impact factor is a citation-based measure that does not account for the quality of the citing source. On the other hand, the h-index represents a journal metric that encapsulates the reputation and consistency of journals. Given, that the SJR-score is not overlapping with either of the measures entirely, different results are expected. For this reason, coefficients and their magnitude will not be compared across analyses using different metrics. The robustness exercises are aimed to bolster the overall dynamics implied and the significance of the results.

Table 4.8 Number of submissions and ranking difference

	3-year IF Ranking Difference	3-year IF Ranking Difference	h-index Ranking Difference	h-index Ranking Difference
Number of submissions	-0.866 (-5.50)	-0.364 (-4.12)	-21.33 (-4.14)	-6.470 (-2.70)
Initial journal ranking		-0.763 (-23.77)		-0.832 (-30.07)
Intercept	-0.109 (-0.17)	3.680 (9.48)	-1.099 (-0.05)	100.5 (9.79)
<i>N</i>	240	240	239	239
<i>R</i> ²	0.113	0.738	0.067	0.807
adj. <i>R</i> ²	0.109	0.736	0.064	0.805

Irrespective of the metric used, Table 4.8 shows: an increasing number of submissions is associated with a decrease in the respective score. When controlling for the ranking of the journal of initial submission, the coefficient of the number of submissions exhibits a lower t-value for the h-index compared with the impact factor or the SJR. This is because the journal ranking based on the h-index differs significantly from the ones implied by the impact factor or the SJR. Still, the result remains significant at the one percent significance level.

Table 4.9 Determinants of initial journal ranking

	3-year IF Doctoral student	h-index Doctoral student
Journal	-0.114	-0.100
strategy	(-1.11)	(-0.90)
Journal	0.142	0.0677
category	(1.33)	(0.58)
Publication	-0.0383	-0.0288
pressure	(-0.82)	(-0.57)
Economics	-0.0975	0.203
	(-1.29)	(2.45)
Male	0.0406	0.00546
	(0.49)	(0.06)
English	0.155	0.0410
	(1.76)	(0.43)
Post-Doc	0.136	0.137
	(1.13)	(1.04)
Ass. professor	0.226	0.384
without	(1.54)	(2.40)
tenure		
Ass. professor	0.256	0.241
with tenure	(1.80)	(1.55)
Professor	0.0773	0.199
	(0.68)	(1.61)
Intercept	1.515	4.511
	(7.08)	(19.33)
<i>N</i>	463	463
<i>R</i> ²	0.029	0.032
adj. <i>R</i> ²	0.008	0.011

Table 4.9 shows that doctoral students submit initially to lower ranked journals compared to all other academic positions, irrespective of what ranking metric is used. Whereas all coefficients on the academic position dummies were associated with high confidence when the SJR was used, only the difference compared to assistant professors without tenure using the h-index remains statistically significant on the five percent level.

Table 4.10 Determinants of publishing journal ranking

	3-year IF Doctoral student	3-year IF Post-Doc	h-index Doctoral student	h-index Post-Doc
Journal strategy	-0.0187 (-0.21)	-0.0187 (-0.21)	-0.0806 (-0.80)	-0.0806 (-0.80)
Journal category	0.120 (1.30)	0.120 (1.30)	0.123 (1.20)	0.123 (1.20)
Publication pressure	0.0244 (0.60)	0.0244 (0.60)	0.102 (2.26)	0.102 (2.26)
Economics	-0.419 (-6.35)	-0.419 (-6.35)	0.0217 (0.29)	0.0217 (0.29)
Male	0.0361 (0.50)	0.0361 (0.50)	0.121 (1.51)	0.121 (1.51)
English	0.0327 (0.42)	0.0327 (0.42)	0.00623 (0.07)	0.00623 (0.07)
Doctoral Student		-0.0181 (-0.17)		-0.0593 (-0.50)
Post-Doc	0.0181 (0.17)		0.0593 (0.50)	
Ass. professor without tenure	0.0561 (0.43)	0.0380 (0.31)	0.111 (0.76)	0.0515 (0.38)
Ass. professor with tenure	0.206 (1.66)	0.188 (1.60)	0.406 (2.92)	0.347 (2.64)
Professor	0.0567 (0.56)	0.0386 (0.41)	0.246 (2.18)	0.187 (1.77)
Intercept	1.243 (6.69)	1.261 (6.53)	3.821 (18.43)	3.880 (18.02)
<i>N</i>	473	473	474	474
<i>R</i> ²	0.105	0.105	0.043	0.043
adj. <i>R</i> ²	0.086	0.086	0.022	0.022

Robustness-checks for the determinants of the ranking of the journal of publication reveal a similar narrative, as shown in Table 4.10. The dynamics of doctoral students publishing in lower ranked journals are supported, no matter what metric is used. While this result was significant on the five-percent level for all academic positions when using the SJR, it is only significant when comparing doctoral students with assistant professors with tenure or full professors and using the h-index. The result of post-doctoral students publishing in lower ranked journals compared to assistant professors without tenure remains robust using the h-index.

Table 4.11 Determinants of ranking difference per submission

	3-year IF Ass. professor without tenure	h-index Ass. professor without tenure
Initial journal ranking	-0.214 (-17.25)	-0.218 (-19.76)
Journal strategy	0.0481 (0.26)	-2.028 (-0.39)
Journal category	0.124 (0.62)	5.296 (0.96)
Publication pressure	-0.00695 (-0.08)	1.631 (0.68)
Male	0.0217 (0.14)	6.277 (1.46)
English	-0.168 (-1.01)	6.936 (1.52)
Doctoral student	-0.0946 (-0.34)	9.516 (1.24)
Post-Doc	-0.271 (-1.12)	1.963 (0.29)
Ass. professor with tenure	0.152 (0.52)	14.36 (1.78)
Professor	-0.158 (-0.62)	7.018 (0.99)
Intercept	0.681 (1.54)	-1.361 (-0.11)
<i>N</i>	240	239
<i>R</i> ²	0.578	0.654
adj. <i>R</i> ²	0.560	0.638

Table 4.11 shows no clear evidence for assistant professors without tenure moving downward in the SJR among academics. However, all the coefficients carry a sign in accordance with our expectations. The same holds true, except for assistant professors without tenure, when using the three-year impact factor. Using the h-index even produces results contrasting the intuition. In terms of the h-index, assistant professors without tenure move down in ranking the fastest.

Which ranking mimics publishing behavior most accurately can be analyzed by comparing the proportion of variance explained by the regressions. For the initial submission, the SJR-model outperforms the the three-year impact factor and h-index with respect to R^2 . For the ranking difference per submission, its R^2 is, in comparison, somewhat better. Regarding the publishing outlets, more variance is explained when using the three-year impact factor, with the SJR performing slightly worse. While this seems to indicate that overall, the SJR mimics submission behavior best, the large share that remains unexplained points to the many random elements in the publishing process.

The dynamics first obtained in the analysis using the SJR are largely similar when using the three-year impact factor or the h-index. The level of confidence tends to be lower, when using either of the previously mentioned metrics. With the exception of the analysis of the ranking difference per submission, the h-index provides coefficients with a higher level of confidence than the three-year impact factor. Given that the impact factor does not adjust for the prestige of the citing source, this could be partly explained by authors accounting for reputation and prestige when choosing a journal.

4.7 Discussion

Young academics are generally inexperienced with the publication process. Nonetheless, our survey shows that they already face considerable pressure to publish. Taken together, these circumstances, in some cases, combine into a mental overload during the early stages of the academic career. In the worst case, doctoral students may quit academia or stick around only to develop mental health problems (Levecque et al., 2017). In this discussion, we want to focus on what causes the stress of young academics could have, what this stress, in turn, implies for young academics' behavior, and what propositions may be suitable to alleviate some of this stress.

4.7.1 Stress factors and implications of stress for doctoral students

The PhD is the first step to an academic career, for which publications are important. Compared to a cumulative dissertation, the monography has a clear disadvantage in that it does not stack the CV with publications needed for academia. The cumulative dissertation may be more attractive for most doctoral students. This is exemplified by the increasing number of students, who opt for an article-based dissertation, which by design exerts publication pressure. Young academics do not have a lot of experience with the publication process. We suspect that some doctoral students feel a disconnect between what they were expecting from their PhD, versus what daily life they then experience. The focus on publications may diminish the time students can spend on learning skills for industry, research communication, or teaching. This

discrepancy can be another source of dissatisfaction and stress. A mediating factor for all these points could be the dissertation supervisor. When enough time is invested, the supervisor can help with the young academics' uncertainties. They can help in choosing suitable journals, put rejections into perspective, but also manage expectations from the get-go. Being supervised in a satisfactory manner is a major determinant of not quitting academia (Mackie & Bates, 2019). However, when doctoral students are not supported by their supervisor (who may feel that they need to allocate their time to more important things than their PhD students), their stress rises.

Stress can then translate into different responses. Young academics are discouraged from pursuing projects with a low probability of getting published, especially innovative work. Even though interdisciplinary work is often touted by universities to be very important, PhD students are not incentivized to conduct such time intensive exercises. When realizing a project, they must improve the probability of acceptance of manuscripts as well as maximizing research output for a given level of effort. In the end, when publication requirements are not met, or will not be met, doctoral students may choose to quit academia. The focus on publications to progress through academia therefore selects people who are successful in publishing and tends to crowd out more intrinsically motivated researchers (comp. with Haucap & Muck, 2015).

4.7.2 Propositions for Improvement

To mitigate the stress stemming from inexperience and expectations mismatch, it is important to match young academics' expectations to publication behavior. Publications are not as important, when students at some point decide to go into industry after the PhD. If given a choice, those students could opt for a monographical dissertation to bypass some publication pressure. Or they may still choose to graduate with a cumulative dissertation, but they could then take the freedom to submit to lower ranked journals, where acceptance is more likely. There are also levels to academic positions as there is competition among universities. The top universities will generally attract the researchers with top publications. Thus, ambitious young academics should already take shots at the top journals during their PhD. If they are rejected, they should not hesitate to resubmit their work to get it published before their deadline. For other students, who aim for a position at smaller, more regional universities, top publications may not even be required (Frey & Briviba, 2021). They are best advised to aim for specialized and well ranked journals. Some stress can be alleviated by getting familiar with the publication process. This article contributes to this point, by showing how academics in different positions resubmit their manuscripts.

In general, we believe that the balance between publications and all other important skills for academia and industry is currently tipped too much towards the importance of publications (Osterloh & Frey, 2021). We therefore argue for universities to adjust their PhD curricula, placing less emphasis on the requirements to publish. As an analogy to pre-registered studies, supervisors could be provided with some power to decide what projects and papers are acceptable as dissertation products before a project is started, irrespective of the outcome. This may support the intrinsic motivation of

young scholars, as they would no longer necessarily be discouraged from pursuing larger and more time-consuming projects. This change would, however, also require professorial appointment committees to emphasize the content of someone's publications and not only the number of publications or the ranking of the journals.

Publishing houses could also contribute to the betterment of the current situation. Innovative papers are often rejected, as they do not fit the status quo or even directly counterargue points raised in research by reviewers. A specific proposition to improve the probability of innovative papers getting published would be qualified random selection applied to papers and even study designs (Osterloh & Frey, 2019). Using this approach, particularly for research designs, would reduce bias against null results and again support intrinsically motivated academics (Kaplan & Irvin, 2015). Decision bodies could even retain flexibility regarding how much they want their subjective judgement to be restricted using different degrees of partiality and weighing for the lottery (Shaw, 2022). Overall, we acknowledge that pressure per se is not evil and can indeed drive productivity. We believe that more creative research would develop in a system less characterized by publication pressure. The current system overemphasizes the importance of bibliometrics. While some proposed solutions inhibit negative externalities themselves, such as more bias in decisions, we believe that they do not outweigh the benefits of reduced publication pressure and more innovative and open research environments. Additionally, they would be directly beneficial to doctoral students, but also to universities, by improving the completion rates of their PhD programs, as well as to research at large.

4.7.3 General Discussion

Our results imply that researchers generally move down in ranking, as they resubmit their manuscript. While shedding light on the determinants concerning publication behavior, other institutional aspects, such as the role of the department's ranking or universities' financial resources, remain to be explored. Taking a rejection as a signal to downgrade the quality of the manuscript may, however, be a flawed strategy. The reviewing process has been shown to be noisy and biased (Seidl et al., 2011). Particularly, referees do often not agree which papers should be accepted (Callaham et al., 1998; Ceci & Peters, 1982; Epstein, 2004; Peters & Ceci, 1980). Referees usually spend little time reviewing a manuscript, meaning they must rely on noisy signals to weigh its quality (Ben-Yashar & Nitzan, 2001). For researchers with sufficient time, a resubmission to a suitable journal on a similar level as the previous submission, may be the best strategy to maximize the journal rank. Academia and the number of articles submitted each year are still growing, hence a slowdown in the publication process can be observed (Ellison, 2002b). The strategies researchers generally choose when trying to publish do not help in reducing the strain on the peer-review system. Additionally, each resubmission inhibits redundant processes on behalf of both the authors and reviewers. A system in which authors are incentivized to reduce the number of submissions could be expected to yield efficiency gains for research institutions and publishing houses.

4.8 Conclusion

While some empirical evidence documents which strategies are used by researchers to exploit bibliometrics, focusing on metrics regarding the publication journal, literature is sparse about scholars' strategies during the entire publication process of a scientific paper. Our survey enables us to study both the journal of initial submission and the publication journal along with the number of submissions in between. The collection and attempt of quantification for this data is to our knowledge a novel addition to the literature. The survey shows how academics in different positions submit their papers, which is especially beneficial to young academics not yet well experienced in scientific publishing. The results show that authors are induced to first submit to a well-ranked journal. If they are rejected, they then choose a lower-ranked journal for resubmission. Researchers, therefore, try to maximize the ranking score of their manuscript. A researcher's field or a paper's topic largely dictates which journals are suitable. The more specialized or niche a topic the more restricted the set of available publication outlets. Broader research fields or topics allow for smaller ranking steps between submissions and are thus better suited for maximizing journal ranking scores. The result also implies that a researcher with unlimited time would submit to journals one after the other according to the respective ranking. Each submission to a new journal demands resources from persons in academia. Journals usually have unique guidelines with respect to how an article must be written and formally presented. Authors must invest much time and effort, which are unrelated to the content of the article. Further, when articles are accepted for review, a submission draws resources from uncompensated reviewers. It may also be argued that reviewer decisions are noisy and susceptible to bias. On one hand, maximizing journal ranking scores thus contributes to the documented phenomenon of rankings displacing heterodox approaches. On the other hand, the strategy itself can result in inefficient processes, in which many reviewers assess roughly the same manuscript. Universities can help address the first issue by adjusting their recruitment practices. Putting a smaller weight on a candidate's bibliometric scores and shifting this attention to the content of their important publications should help reduce the effect journal rankings have on heterodox approaches. The problem regarding inefficient reviewing is that authority about the maximum number of submissions for a given paper lies solely with the authors. If journal rankings were not as important to the academic career, researchers might be more inclined to find a suitable journal from the start.

Most doctoral students in economics and business nowadays are required to produce a certain number of publications in a limited timeframe. Compared to more senior academics, for which the reputation of the publication outlet is more important, doctoral students face more time pressure. Doctoral students thus initially submit to lower-ranked journals and ultimately publish in lower-ranked journals compared to more senior academics. Doctoral students also ultimately publish in lower-ranked journals than academics in other positions. The scholarly literature along with the tendency in the rest of our results suggest, that to attain a professorship, researchers need to publish in top journals. The fact that doctoral students submit to lower-ranked journals

could therefore reflect that doctoral students in the German-speaking area are not yet fully committed to an academic career. Labor market options outside academia, especially for junior academics in business, may remain attractive. If universities see a problem in not having enough junior academics remaining in academia, they may have to lower the importance they attribute to top publications in professorial appointments.

Future research may aim to obtain data directly from journal editors to find out how journals choose reviewers. When replicating the survey, researchers could require respondents to provide at least the most recent publication effort but then allow for further publication efforts in chronological order to reduce bias. Insightful data could also be gained by a survey obtaining all submission outlets of researchers' publication efforts. This would allow for a more granular analysis of the issues discussed in this article and may even shed light on strategic behavior of academics with respect to publishing houses. Finally, a similar survey as was used in this article could be conducted in other regions. Adjusting the survey to obtain more detailed data on the types of pressure researchers face would be particularly interesting.

Appendix Chapter 4.

Figure D.4.3 Distribution of the ranking difference variable

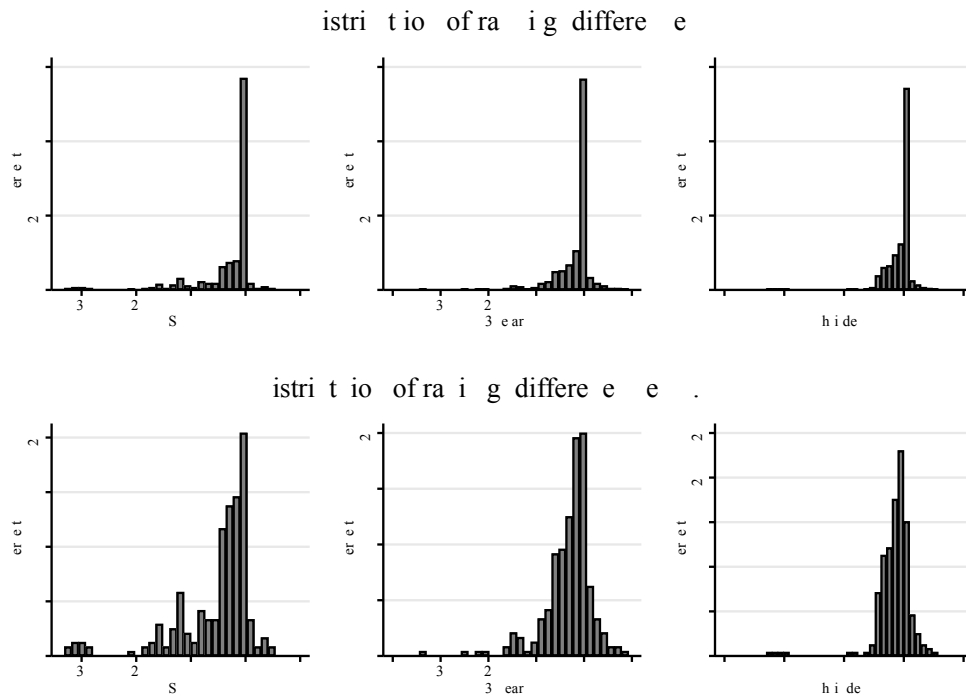


Figure D.4.3 shows the distribution of the ranking difference variable. The upper panel also contains those respondents, who have successfully published in the journal of initial submission. Their ranking difference is thus zero. To get a better glimpse of the distribution of the observations actually used for analysis, the lower panel shows the same variable, but excludes the zero-observations. The h-index plot in the upper panel, may give the impression, that there are many positive values present in the sample, which would be counterintuitive. But the positioning of the bar comes down to the interval of values it represents and the interval is dictated by the statistical software. Thus, the positioning of the bar, seemingly to the right of zero, simply means that the interval spans from zero to some positive value, with the vast majority of the values being zero.

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