

Essays on business and politics in resource-abundant,
low-income countries.

Sören Felix Schilling

Department of International Economics, Government and Business

Copenhagen Business School (CBS)

Submitted: November 13, 2023

Advisors: Mogens K. Justesen (CBS) & Benjamin C.K. Egerod (CBS)

Abstract

This dissertation examines links between politics and businesses in resource-abundant, low-income countries. I argue that privatizations and the awarding of property rights do not separate business and politics per se. Instead, they shift the way these two spheres interact. Whether this shift leads to socio-economic development, depends on the respective implementation of property rights. Each chapter of this dissertation examines therefore with quantitative methods on a micro level how powerful actors control, allocate and regulate assets in the private sector. Chapter One and Two explore the phenomenon of cronyism, where firms and politicians engage in trades to obtain mutual benefits in the case of Mozambique, a country that established market oriented reforms and experienced a resource fuelled FDI bonanza from 2009 onwards. The first chapter focuses on business partnerships or co-investment as a means for politicians to gain private benefits from holding political office. Chapter Two focuses on political selection and finds that the ruling elite in an electoral autocracy constructs and co-opts the emerging business elites into positions of raising economic sector. Chapter Three examines whether the awarding of mining licenses in the DRC and its neighboring countries reduces the link between the economic value of a mine and local levels of conflict. This chapter identifies property rights gaps as an important constraint to such formalization efforts and underscores the necessity for independent stakeholders to monitor the design and enforcement of property rights.

Resumé

Denne afhandling undersøger forbindelserne mellem politik og erhvervsliv i lavindkomstlande med mange ressourcer. Jeg argumenterer for, at privatiseringer og tildeling af ejendomsrettigheder ikke i sig selv adskiller forretning og politik. I stedet ændrer de den måde, hvorpå disse to sfærer interagerer. Hvorvidt dette skift fører til socioøkonomisk udvikling, afhænger af den respektive implementering af ejendomsrettigheder. Hvert kapitel i denne afhandling undersøger derfor med kvantitative metoder på mikroniveau, hvordan magtfulde aktører kontrollerer, allokerer og regulerer aktiver i den private sektor. Kapitel et og to undersøger fænomenet kammerateri, hvor virksomheder og politikere indgår i handler for at opnå gensidige fordele i Mozambique, et land, der indførte markedsorienterede reformer og oplevede en ressourcedrevet FDI-bonanza fra 2009 og frem. Det første kapitel fokuserer på forretningspartnerskaber eller saminvesteringer som et midlertidigt politisk til at opnå private fordele ved at have et politisk embede. Kapitel to fokuserer på politisk udvælgelse og finder, at den herskende elite i et autokratisk valgsystem konstruerer og kooperer de nye erhvervseliter til positioner, der øger den økonomiske sektor. Kapitel tre undersøger, om tildelingen af minelicenser i DRC og dets nabolande reducerer forbindelsen mellem den økonomiske værdi af en mine og det lokale konflikt-niveau. Kapitlet identificerer huller i ejendomsretten som en vigtig hindring for sådanne formaliseringsbestræbelser og understreger nødvendigheden af, at uafhængige interesser overvåger udformningen og håndhævelsen af ejendomsretten.

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Introduction

Policies aimed at strengthening and formalizing the private sector in natural resource-abundant, low-income economies are widely implemented worldwide¹. The goal of these policies is to contribute to higher levels of state capacity, encourage competition and, ultimately, create more transparent and inclusive societies (Rodrik 2006). Privatizations are associated with more transparent markets, improved resource allocation, lower transaction costs, and streamlined decision-making (Baumol 1982). However, privatizations and capital mobility, which often complement each other², do not necessarily increase social welfare. They can also be used for purposes other than social welfare, such as concealing, protecting, and transferring resource windfalls³. The literature widely acknowledges that in low-income countries, weak political institutions confound the expected relationship between higher wealth and more inclusive economic development (Brollo et al. 2013; J. F. Cust and D. Mihalyi 2017; Mehlum et al. 2006; James A. Robinson, Torvik, et al. 2006).

Despite acknowledging the importance of processes like rent capture or cronyism, we know little about the dynamics between politics and businesses in this domain at the micro level. Comparative political science shows that ruling elites in resource-rich, low-income countries employ both cooperative and fragmented strategies to maintain their personal grip on power and act in their own economic interests or lobby for affiliated firms (e.g. Arriola et al. (2021), Meng (2021a), Stokes et al. (2013), Szakonyi (2018), Truex (2014), and Woldense and Kroeger (2023)). However, these findings do not fully explain how

¹For instance, the International Aid Transparency Initiative (IATI) database documents aid projects that aim to strengthen administrative capacities for documenting mineral and oil extraction across 60 low- to middle-income countries since 2001.

²An common policy goal of resource-abundant, low-income countries is to attract foreign capital in order to increase domestic investments in the private sector (Hirschman 1957).

³Andersen, Johannessen, Lassen, et al. (2017) show that a jump in petroleum income corresponds with higher deposits in offshore bank accounts where political institutions are weak

politics and business interrelate in this context. How do political elites gain economic rents after they privatize the economy? When and why do rising business elites become a threat to ruling autocratic regimes? When and why does' political influence continue despite improvements in property rights enforcement?

To ensure that relevant micro-level evidence contributes to the analysis of such questions, it is crucial to measure economic activities and ownership structures at the level of individuals and firms. However, the poor quality of administrative records in low-income countries poses a challenge to observing activities at this level. This dissertation introduces novel methods for collecting, cleaning, validating, and analyzing a large number of administrative records. These analyses contribute to more general theoretical arguments on how business and politics are related in resource-abundant, low-income countries. The new empirical evidence identified by this research approach and the associated findings support the policy goal of increased transparency over the ownership structure of economic activities in low-income countries.

The dissertation examines the links between business and politics in Mozambique, as well as in the Democratic Republic of the Congo and its neighboring countries. These cases were selected because they (1) extract commodities that are increasingly important in the global supply of electronic devices and energy production and (2) have received substantial foreign investments and implemented market-strengthening reforms. This introduction chapter summarizes the main findings of each chapter, elaborates on the methodological contributions, and outlines how the case findings can be generalized and related to policy challenges of our time.

Summary of Results

Table 1 summarizes how each chapter examines the relationship between business and politics in resource-abundant, low-income countries.

Chapter One explores the phenomenon of cronyism, where firms and politicians engage in trade to obtain mutual benefits. The chapter focuses on the specific mechanism of non-market behavior in business partnerships or co-investment as a way for politicians to

Table 1: Comparison of private sector events, expected outcome without political interference and effects of actuarial interference in each chapter of this dissertation

Chapter	Event Type	Expected Effect without interference	How political actors interfere
1	Transformation towards a market-based economy	Privatization separates politics and the private sector → support for democratization (J. Williamson 1993) → inclusive economic growth (Rodrik 2006)	Political actors strategically position themselves in private firms
2	Rapid growth in the private sector	Rising economic forces → disrupt the power of existing political elites (Acemoglu and James A Robinson 2006)	Political elites select the new economic elite
3	Property rights over mining activities	Property rights reduce the threat of expropriation and provide better enforcement → less conflict (Besley and Ghatak 2010)	Rulers strategically design, award, and enforce mining licenses

reap private benefits from holding political office. My colleagues and I use public registry data from Mozambique to construct a network of relationships among business owners and politically exposed persons (PEPs). The main finding is that holding political office is associated with faster growth in personal business networks for PEPs. The results suggest that politicians leverage their positions to create and control rents across the private sector. The study contributes to the understanding of how politicians obtain rents from private-sector activities and demonstrates the use of publicly available business registry data in investigating political economy questions.

Chapter Two finds that ruling party elites in authoritarian regimes construct and co-opt emerging business elites into positions of firm ownership and political office. This strategy, which we call "vertical political integration", enables the ruling party to address two problems that are inherent in authoritarian politics: a dual information problem and a dual commitment problem. The dual information problem refers to the separate challenges of information asymmetry faced by authoritarian governments and business elites, where both the government and the private sector require access to credible and timely information. The dual commitment problem pertains to the challenge where the

rise of new business elites is seen as a potential threat to the ruling regime's political survival, and from the perspective of business elites, the incumbent political elite is also viewed as a potential threat due to its inability to provide credible commitments to the private sector. By bringing business elites into government, the ruling party can access their knowledge and expertise while also monitoring their actions and loyalty. Similarly, business elites benefit from a seat in political office as it reduces policy uncertainty and allows them to shape regulations in their industries. The effectiveness of vertical political integration is amplified when the ruling party actively shapes selection into firm ownership and recruits socially proximate individuals.

The empirical analysis focuses on Mozambique, an electoral autocracy, and leverages the discovery of gas as a natural experiment. The study finds that members of the business elite involved in the gas industry are more likely to be recruited into political office. Additionally, the ruling party disproportionately recruits individuals from their social networks into firm ownership and political office. The findings suggest that the ruling political elite strategically installed members of their social network as firm owners in the gas industry to maintain control and avoid the emergence of a new business elite. Overall, this paper contributes to the literature on authoritarian politics, political selection, patronage politics, and the entry of business elites into politics. It sheds light on how ruling party elites in authoritarian regimes use vertical political integration to shape business ownership and selection into political office, ultimately contributing to regime stability.

Chapter Three shows that mining licenses can reduce local conflict levels if they are properly enforced and minimize political influence over the mine. However, in settings with low state capacity, unenforced mining licenses can actually increase conflict. The study focuses on the effects of Section 1502 of the Dodd-Frank Act, which requires the documentation of origin for certain minerals in the Democratic Republic of the Congo and neighboring countries. The analysis finds that licenses for these minerals weaken the positive relationship between price jumps and conflict levels, while unenforced licenses for other minerals have no effect or increase the likelihood of conflict. The study also

highlights the selective enforcement of property rights and the potential for new conflicts to arise from competing property claims. Overall, the findings suggest that foreign enforcement and monitoring of mining licenses is crucial to reducing conflict over valuable resources in low-income countries.

Case selection

Each chapter of this dissertation examines the interaction between business and politics in settings that are closely linked to contemporary policy-making and fundamental challenges of our time. Two global trends help to demonstrate the external validity of the business-politics links in Mozambique, and in the Democratic Republic of the Congo and its neighbors.

The first trend is the skyrocketing demand for minerals, especially when compared to the demand for other natural resources. Figure 1 presents commodity demand estimations from the International Energy Agency (Birol 2022). On the left scale, the figure shows the estimated global demand for natural gas and oil under the "Announced Pledges Scenario" where governments will, on average, retain their already made commitments to reduce CO^2 emissions in the future. On the right scale, the global demand projections for five critical minerals needed for clean energy transitions under the same scenario. The plot illustrates two trends. Firstly, even after the global demand for oil and gas reaches its peak in the near future, the demand for these commodities will remain at a high level for several more decades. Secondly, the so called "Green Transformation" towards renewable energy will substantially increase the global demand for minerals including cobalt, copper, tantalum, tin, and tungsten for many decades. Combined, these economic trends show the potential for the emergence rents that could be captured by the governments of resource-abundant, low-income countries. Natural resources rents can serve as an increasingly important source of revenue for state budgets, but they also might affect Foreign Direct Investment (FDI) decisions, as FDI in low-income countries is closely related to the availability of natural resources (Toews and Vézina 2022). Scholars consider FDI as a crucial component of economic development (Hirschman 1957) and attribute it to

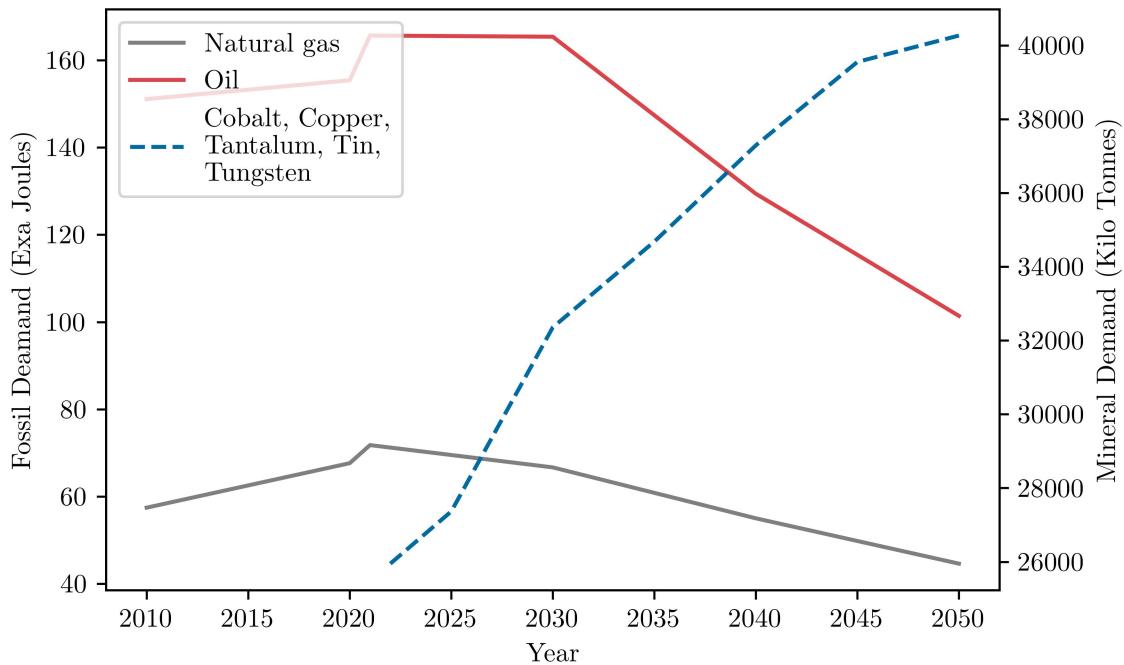


Figure 1: Estimated global demand for fossil fuels and critical minerals 2010-2050 (Announced Pledges Scenario). Source: World Energy Outlook 2022 (Birol 2022)

transfers and spillovers to local firms, such as technology and skills (Javorcik 2015).

What does this dual commodity boom imply for low-income countries? Figure 2 plots the share of the Gross Domestic Product (GDP) for exports of oil- and minerals⁴ as well as resource taxation (UNU-WIDER 2023) for the 68 least developed countries in the world⁵ between 2001 and 2022. The plot shows that both oil- and mineral revenues contribute substantially to these economies. While oil revenues have been a major, steady income stream for the first two decades of the twenty-first century, mineral revenues have become increasingly important and have exceeded oil exports from the least developed countries, on average, since 2020. Formal taxation associated with oil and minerals plays only a minor role as an income stream (see Figure 2 below); other natural resource-related revenue schemes, including joint ventures and public-private partnerships, are much more important. This suggests that politically powerful actors often have indirect or informal control over rents from natural resource revenues. This image contrasts markedly with the predominant view in the literature, which assumes that political actors in low-income

⁴source to database: [link](#)

⁵Defined as those in the lowest two quintiles of mean Gross National Income (GNI) per capita using the World Bank Atlas method.

countries have more or less direct access to rents through their control over political institutions (e.g., Andersen, Johannessen, Lassen, et al. (2017), Mehlum et al. (2006), and James A. Robinson, Torvik, et al. (2006)).

The second global trend in business-politics ties in contemporary, resource-rich, low-income nations relates to changing policy preferences. Two policy patterns lend support to the notion that the relationship between politics and business is more complex than mere public sector corruption. Firstly, Structural Adjustment Programs (SAPs), and related policies associated with the Washington Consensus, limit direct political control over assets. Their purpose is to address economic challenges by reducing the influence of the state and encouraging private sector growth. These policies aim to attract foreign investment by lowering taxes and royalties on resource extraction, promoting privatization, and stimulating the private sector. Additionally, they encompass broader reforms like trade liberalization, fiscal discipline, and monetary stabilization to create a more stable economic environment. While the effectiveness of these policies remains a subject of debate⁶, they play a significant role in the economic development of many developing nations (Rodrik 2006). In sum, these policies limit direct political control over rents from natural resource extraction.

Additionally, regulatory policies like the Extractive Industries Transparency Initiative (EITI), Kimberly Process Certification Scheme (Kimberley Accord), US Foreign Corrupt Practices Act (FCPA), and Dodd-Frank Act Section 1502 collectively serve as tools that enhance transparency and accountability as they curb the ability of political elites to capture rents through state-controlled entities and the public sector. The EITI obliges governments and companies to disclose payments and revenues in the extractive industry, reducing the opportunity for political elites to divert resource revenues without scrutiny (Haufler 2010). Similarly, the Kimberly Process aims to prevent trade in conflict diamonds, thereby diminishing a significant source of income for political elites (Haufler 2009). The FCPA discourages corruption in international business dealings, further de-

⁶While SAPs have had some success in diversifying economies, they are heavily criticized for causing social and economic hardships, including job losses and reduced social services, and for making countries overly dependent on volatile global commodity markets.

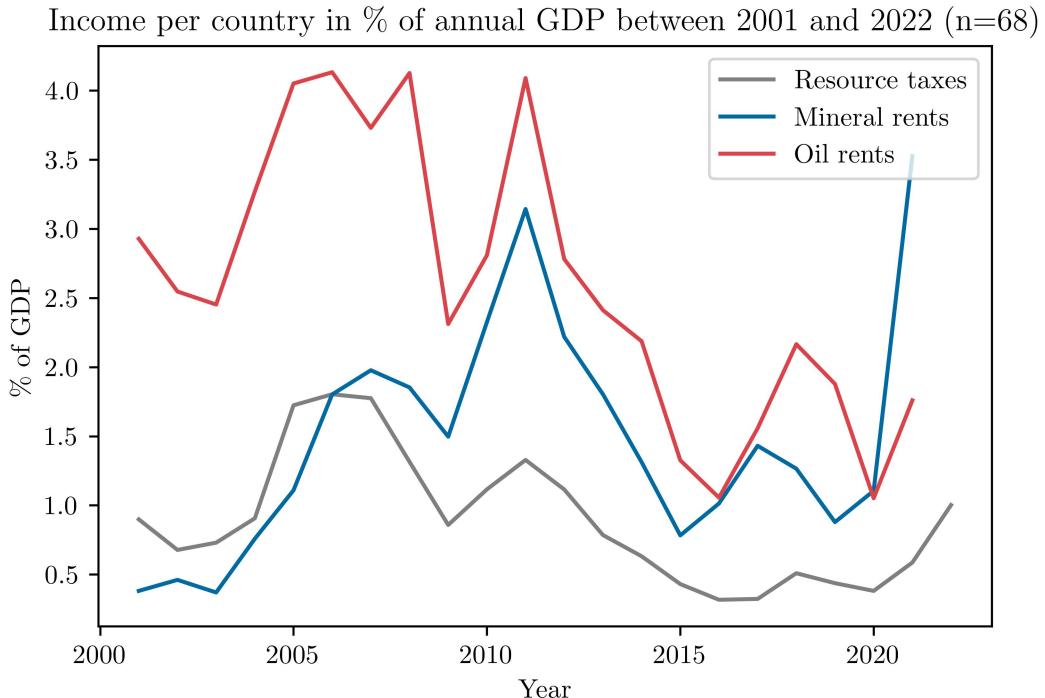


Figure 2: Oil revenues, mineral revenues, and resource taxation as a percentage of the national GDP of the 68 lowest income countries in the world between 2001 and 2022. See the main text for sample selection and data sources.

terring political elites from using their influence to extract rents through corrupt means (H. Christensen et al. 2022). Lastly, Dodd-Frank Act Section 1502 promotes supply chain transparency of so-called conflict minerals, making it more difficult for political elites to profit from illicit mineral trade in conflict regions (Parker and Vadheim 2017).

At the same time, the global rise of offshore bank accounts (Tørsløv and Wier 2022) has significantly facilitated the ease with which individuals and firms, including political elites, can conceal their ill-gotten gains within the private sector. These offshore accounts enable individuals to hide assets, evade taxes, and launder money through complex webs of international transactions that provide a shroud of financial secrecy (O'Donovan et al. 2019; White 2020). This opacity in financial dealings not only enables the accumulation of illicit wealth but also makes it exceedingly difficult for governments and regulators to track and tax these funds, ultimately contributing to growing wealth inequality.

In summary, these global trends motivate the case selection of this dissertation. Mozambique is one of the largest sub-Saharan countries to successfully implement SAPs (Cramer 2001). It also has received Africa's largest FDI investment (until 2021) due to

a giant gas discovery in 2009 (Toews and Vézina 2022). Figure 3 plots the location of exploratory drilling holes and gas discoveries between 1953 and 2017. The DRC and its neighboring countries depend economically heavily on the extraction of cobalt, copper, tantalum, tin, and tungsten. Figure 4 plots mining activities in these ten countries. Hence, both cases are strongly influenced by the dynamics of these global trends.

Methodological approach

To identify causal relationships between politics and business, it would be ideal to conduct experiments where a random sample of individuals is treated, and their subsequent behavior in politics or the private sector is studied. While prior studies follow this approach, there are obvious constraints on how relevant these identified business-politics links can be. For example, Armand et al. (2020, 2023) evaluate the impact of an extensive information and deliberation campaign about natural resource management in Cabo Delgado Province, Mozambique, in August-September 2017. The studies, sponsored by a diverse coalition of international, national, and local governmental and non-governmental institutions, aimed to enhance understanding of issues around management of natural resource windfalls. They stimulated citizen engagement in decision-making processes and examined the honesty of local leaders by providing 400 Meticais (around 6 USD) to village leaders, instructing the leaders to use the money in various ways, and observing their behavior. As expected, leaders behave more public-mindedly during treatments that enable others to assess the leader's honesty. At one level, these results support the idea that more transparency contributes to a variety of good social outcomes. At the same time, however, one might wonder how many higher-level Mozambican politicians would support such a study beyond the village level. They are believed to profit personally at significantly higher levels across all major industries in Cabo Delgado, including procurement contracts for aid, gas extraction, and conflict-related equipment (Columbo 2022; Hanlon 2022). It does not seem far-fetched to imagine that political leaders support projects that render the behavior of others more transparent, as long as institutional designs continue to hinder observations of their own behavior. In other words, while the present study was

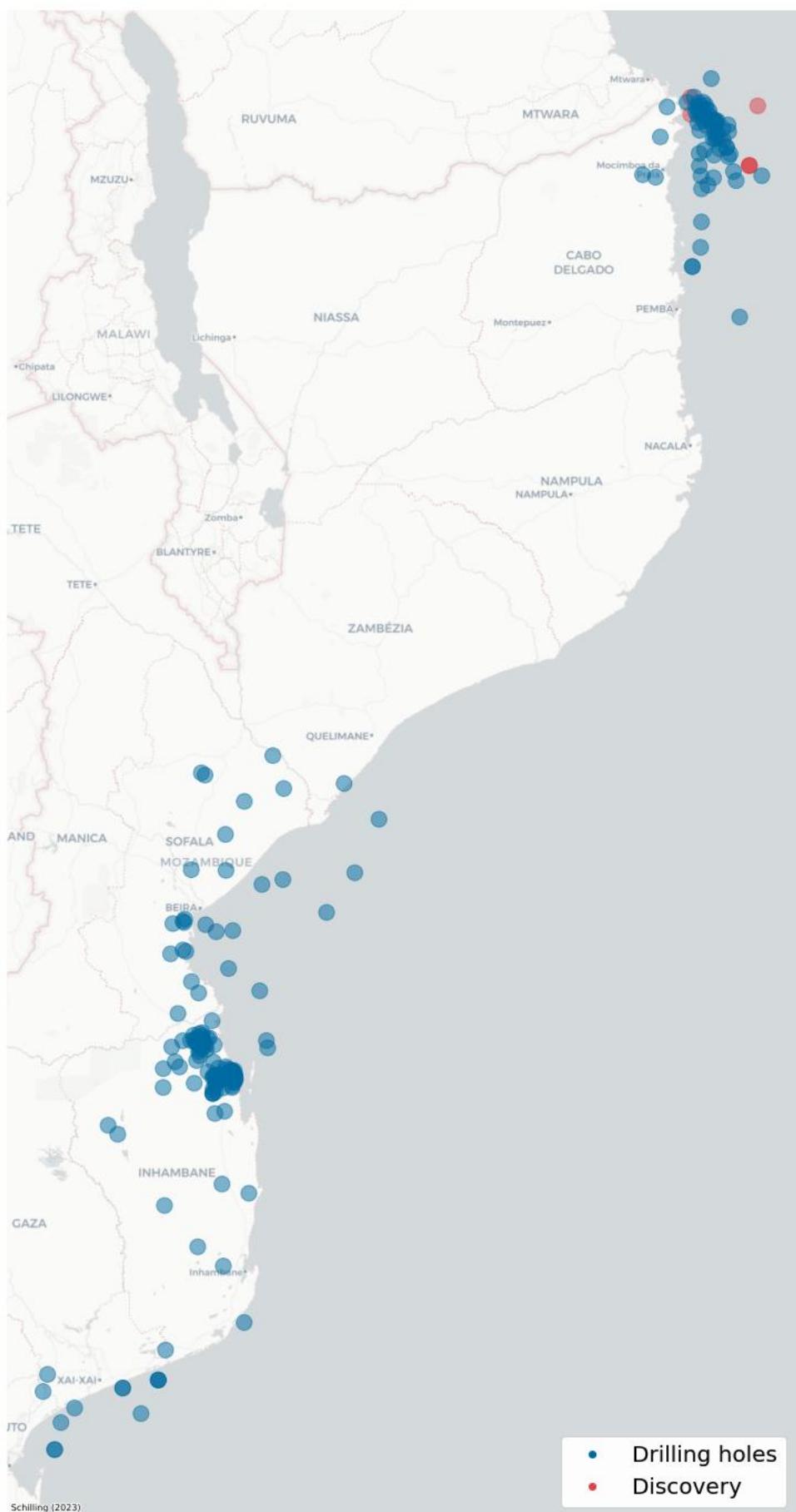


Figure 3: Drilling holes and gas discoveries in Mozambique 1953-2017. Source: Instituto Nacional de Petróleo(INP) and J. Cust et al. (2021)

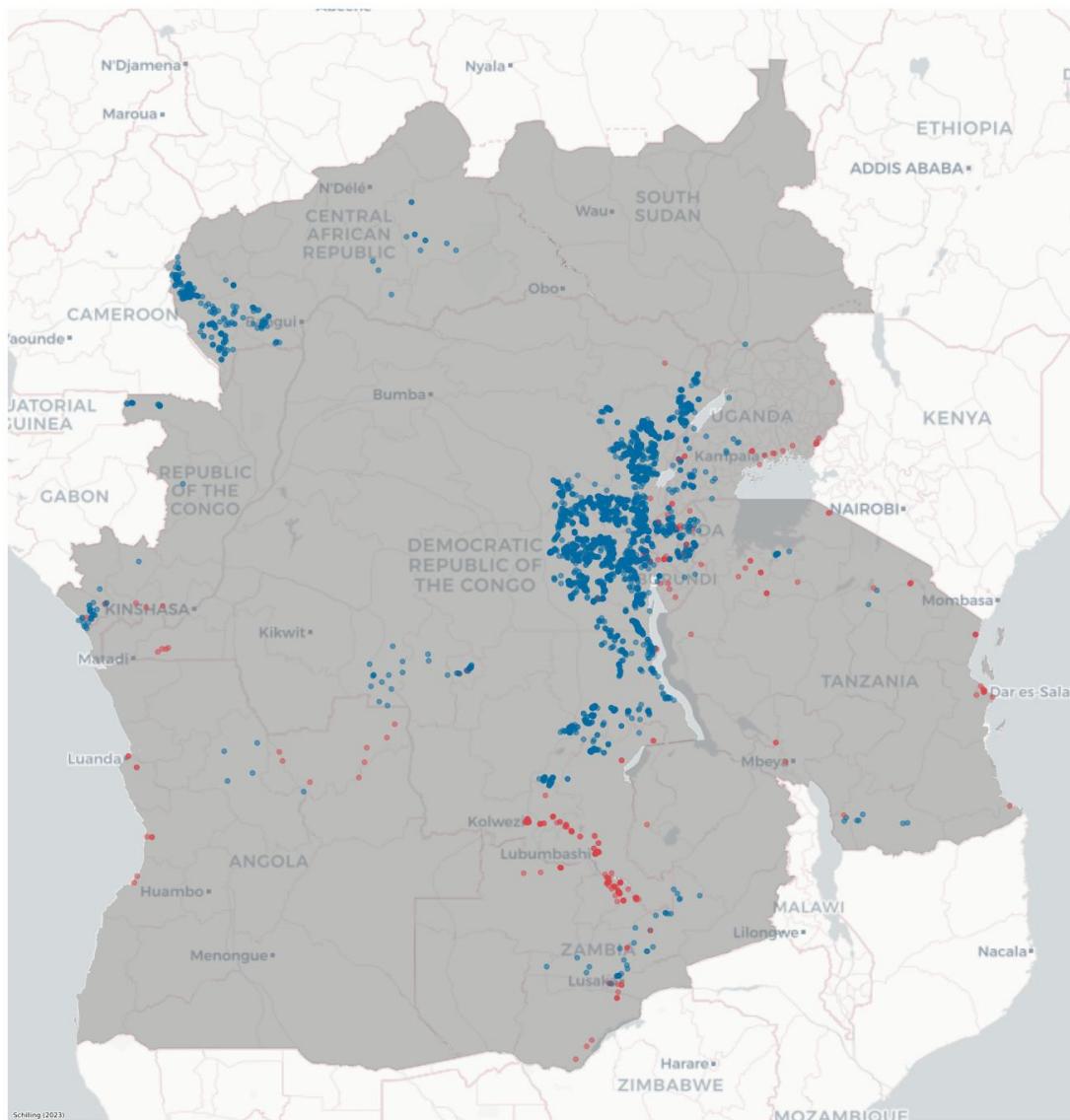


Figure 4: Location of artisanal or small-scale mining and large-scale mining (LSM) sides. The dark grey areas mark the territory of countries that are affected by Dodd-Frank Act section 1502 after 2010

being designed, I am sensitive to the constraints on the external validity of experimental designs in this field of research and sought to craft a research framework that could sidestep these constraints.

To establish cause-and-effect relationships with more external validity, Toews and Vézina (2022) use a proprietary database to examine the link between resource discoveries and FDI in Mozambique with a quasi-experimental design ⁷. Such non-public datasets, in this case fDi markets, help scholars to overcome constraints that poorly maintained administrative records impose on research, especially in Africa (Jerven 2013). Today, scholars use numerous proprietary services including Orbis, fDi markets, or the SNL Metals & Mining Dataset. Such data is used to study a wide range of industries and entire countries (Kalemli-Ozcan et al. 2015). However, these data sources have several constraints. The most important ones are a lack of transparency, potentially biased observations, and non-replicability of published results. For example, fDi markets documents a major fertilizer plant in northern Mozambique. This FDI project would process natural gas into fertilizer, which in turn would enhance agricultural yields and thereby upgrade the Mozambican economy significantly. However, due to changing circumstances in Mozambique, the Norwegian parent company withdrew from this FDI project in 2020. Since fDi markets documents the announcement of FDI projects but not their cancellation, it creates misleading image of a thriving economy in Mozambique. Similarly, the Orbis database documents only a fraction of legally registered entities that operate in Mozambique. These gaps illustrate how proprietary data might present a non-representative and biased sample of economic activities in resource-abundant, low-income countries.

To account for such challenges, the chapters in this dissertation utilize unstructured or semi-structured administrative records, such as ownership structure, company mission statements, or the location of businesses, to observe individual characteristics. This approach does not solve all present data issues. Instead, it provides a baseline measure of all legal, i.e., formally documented, business activities. To validate this measure, I link

⁷Chapter Two uses the same identification approach and elaborates on the design.

it to the mentioned proprietary databases and measures of trade using the BACI dataset (Gaulier and Zignago 2010) to estimate economic activities and their beneficial ownership structure.

Chapters One and Two use a digitized version of the Boletim da Republica, Serie III (BdR3) to establish a consistent register of companies and their owners. This document's legislative structure is derived from Portuguese rule, and all legal entities in Mozambique, such as enterprises, cooperatives, and political parties, must publish their constitution or modifications (including closures) in the official gazette, known as BdR3. The registry, initiated at Independence in 1975, offers a comprehensive public list of formally established firms in the country. BdR3 documents are accessible for review at the National Archive or online (since 2006). Appendix 2 in Chapter One provides an example of such a document. Gazette entries serve essentially as the formal and legal publication of information transcribed manually in notarial offices throughout the country. Although no official digital data repository exists, a local private company, Pandoras Box Lda., aims to digitize all laws and announcements published in various series of the Boletim da Republica, including BdR3. Their primary goal is to enable users to quickly access relevant material by searching for keywords (e.g., firm names) in scanned copies of the original publications. The searchable index of BdR3 contains most of the information found in each published announcement concerning legal entities.

Chapter Three leverages public data from mining cadastres to study the effect of mining licenses on conflict. Mining cadastres serve as digital repositories that consolidate and organize essential information regarding property rights for both artisanal and large-scale mining (ASM and LSM). While these cadastres are publicly accessible, the underlying data is typically unstructured, making bulk downloads challenging. To tackle this issue, a scraping framework called Memorious was used to extract data from each mining portal. The entirety of these cadastres' historical paper-based records of mining licenses since independence is now available online. This technical achievement facilitates transparency and governance in the mining sector.

Technological innovations such as artificial intelligence (AI), reinforce the issue of

information asymmetries that non-public databases create. Initiatives like the Open for Good Alliance advocate for the protection of open-source data from low-income countries against privatization and exploitation, addressing concerns about the lack of localized training data and questioning the equitable distribution of benefits. A key requirement for such public goods is a stable commons management design which involves establishing clear boundaries for common pool resources, effective exclusion of unauthorized third parties, and engaging in collaborative governance to ensure sustainable and equitable use of shared resources (Ostrom 1990). While it is beyond the scope of this dissertation to provide a full commons management plan for the administrative data that I processed, the thesis data companion⁸ provides a repository to inform interested stakeholders.

Link to the Literature

The findings of this dissertation are relevant to various fields, including Political Science, Economics, and Business. The first two chapters examine the links between politics and business at an individual level, encompassing a wide range of activities. Chapter Three investigates how business-politics links shape the design and enforcement of public policies, either to serve individual interests or to constrain the interests of competitors. The accumulation of power is a common goal of business-politics links, where actors leverage their political power to accumulate economic power and vice versa.

This is related to rent-seeking, which refers to extracting value from political, social, and economic processes without creating new wealth. By definition, this process is not Pareto efficient (Krueger 1974; Tullock 1967). On the other hand, corruption, which involves the abuse of entrusted power for private gain, can lead to Pareto optimal situations (Tollison 2012). Quantitative studies that examine mechanisms related to such activities cannot confidently distinguish between these types. Therefore, the way business and politics interrelate in Mozambique can best be described as "rent capture", a term used by Andersen, Johannessen, and Rijkers (2022) to encompass rent-seeking, corruption, and similar activities. The thesis provides evidence that business-politics links often operate

⁸<https://schillingerkurs.github.io/thesis/>

through formal and informal social networks. The thesis also contributes evidence that rent capture is often not illegal. Indeed, it is legal in Mozambique, a country that has reformed its institutions as requested by foreign actors.

While the first and second chapters of the dissertation examine the direct link between politics and business, the third chapter investigates the effects of one outcome of this relationship. Business links shape the design and enforcement of mining licenses, creating asymmetric interference and property rights gaps, which in turn relate to local conflicts. The literature suggests that resource extraction, particularly mining, is linked to higher levels of corruption (Knutsen, Kotsadam, et al. 2017) and conflicts near mining sites (Berman et al. 2017; D. Christensen 2019; Rigterink et al. 2023) due to exportation by political actors and asymmetric market power among participants. This chapter demonstrates that the legal status of mining activities over time moderates the link between resource extraction and conflict in low-income countries. This finding adds a new perspective to the empirical literature on property rights (Galiani and Schargrodsy 2010; Ho 2021). Technical solutions, such as blockchains, are widely discussed approaches to address disputed property claims in developing countries (Kshetri and Voas 2018). The third chapter demonstrates that purely technical solutions without independent stakeholders ensuring that (property) rights are enforced improve the de facto quality of property rights very little.

Chapter 1

Politicians doing business: Evidence from Mozambique's firm registry

SAM JONES, UNIVERSITY OF COPENHAGEN

FELIX SCHILLING, COPENHAGEN BUSINESS SCHOOL

FINN TARP, UNIVERSITY OF COPENHAGEN

1.1 Introduction

The¹ textbook notion of independent firms operating in competitive markets at arms-length from politicians is a useful theoretical benchmark. However, in many settings firms and politicians make trades to obtain mutual benefits, using both legal and illegal channels (Alok and Ayyagari 2020; E. K. Choi 2009; Lim and Stern 2003; Shleifer and Vishny 1994). To illustrate, the ‘Luanda Leaks’ from Angola detailed the many ways in which businesses owned by the ex-president’s daughter, Isabel dos Santos, benefited from her father’s political patronage.² And during the COVID-19 pandemic, investigations suggest that associates of politicians from the UK’s governing Conservative Party have been major beneficiaries of emergency public procurement of medical supplies and protective gear Wise (2021).

¹This chapter is a revised draft of the working paper Jones, Schilling, et al. (2021)

² Under a new president, the Angolan government has sought to recover US\$ 1.1 billion from her estate. See [here](#).

Deviations from the textbook model of strictly independent private and public spheres fall under the general rubric of ‘cronyism’ (Haber 2002). Much of the existing literature on this phenomenon has focused on the benefits private firms reap from nurturing political connections (Goldman et al. 2009; S. Johnson and Mitton 2003), sometimes linked to concerns around state capture (Canen and Wantchekon 2022; Hellman et al. 2003). However, while accumulation of private wealth by individual politicians or their families associated with access to public office has also been widely documented, such as in cases of grand corruption, the specific mechanisms by which these gains in wealth occur has been less clear.

In this paper we shed light on an under-studied channel through which serving politicians may reap private benefits from holding political office. Complementing existing studies on bribes (Mcmillan and Zoido 2004), employment (Fafchamps and Labonne 2017) and land-acquisition (Chen and Kung 2019), we consider business partnerships or co-investment. In developing countries, where both legislation and capacity to regulate conflicts of interest are limited, individuals serving in high political office are often simultaneously active business owners, holding interests in multiple firms. As such, rents accruing to private firms from political protection or other privileges (e.g., special permits, licenses etc.) can be shared and laundered with their ‘patrons’ through formalized ongoing business relationships, such as joint ownership or sub-contracting.

Taking as our point of departure that co-investment not only occurs in but to some extent is governed through relational ties, we seek to quantify the impact of holding political office on the size and structure of exposed individuals’ personal business networks. We use public registry data from Mozambique and construct the complete network of relationships among business owners covering all private (formal) firms established in the country from 1975 to 2019. Reflecting the incipient nature of the private sector in the country, the vast majority of businesses established during this period have been either sole-owned or joint stock companies, with natural persons as shareholders. The registry information allows us to construct time-series metrics of business performance, including the number of companies owned by each individual, as well as indicators of their social

capital within the network of firm-owners, such as their ‘godfather centrality’ as per Matthew O. Jackson (2020). Linking this to a new hand-collected database of politically-exposed persons (PEPs), we use both individual fixed-effects and lagged outcome models to bracket estimates of the causal contribution of holding political office to own-business outcomes over the period 1985-2019.³

Our main finding is that the average PEP achieved significantly faster growth in their personal business network along multiple dimensions during their period in office. Our preferred results, obtained from the sample of individuals who became a PEP at some point, show that holding political office is associated with around a 7 percentage point faster growth in the number of companies in which they have an ownership interest and a 10 percentage point larger increase in both their godfather and decay centrality positions (over five years). In relative terms, these effect sizes are in the order of one-third to one-half the magnitude of control group means. Thus, when we compare current PEPs against future PEPs, current PEPs have ownership stakes in more companies and obtain a stronger structural position in the business network, especially as brokers between other firm owners. These results are confirmed by event study estimates, which indicate the largest gains are made by politicians who have been in office for around 10 years.

Digging deeper, we find that our results are driven primarily by holders of party political rather than executive offices; but there is some evidence of gains for the latter group *after* they leave office. Furthermore, taking into account spillover effects associated with family connections, our results increase in magnitude when we re-run the analysis at the family level, indicating substantial spillovers beyond individual politicians. Consistent with the notion of rent-sharing via co-investments, we show PEPs systematically prefer to take ownership in joint-stock companies and predominantly accumulate interests in business services and investment/finance companies. This conforms to a pattern whereby holders of political office leverage their positions to create and control rents across the private sector, acting as gatekeepers to state contracts and genuine (foreign direct)

³ There has never been any general legal prohibition on serving politicians (or public servants) from actively pursuing their own business interests in Mozambique, this openness extends to the 2013 Public Probity Law (Levy and Williams 2014).

investment.

The contribution of this study is threefold. First, we provide rigorous evidence of an important mechanism through which serving politicians obtain a share of rents from private sector activities, namely co-investment. We do so in a low-income country context where, as in other weak-governance settings, the activity of political elites in the formal private sector has been frequently observed. Second, we consider a distinctive and novel set of outcomes over an extended period of time. Based on rich registry data, we quantify the size and structure of private business networks associated with individual politicians, including measures of network centrality. In so doing, we provide support to existing work, largely of a qualitative nature in Mozambique and beyond (Hanlon 2002; Macuane et al. 2018; Twijnstra 2015), which contends politicians frequently act as rentier-brokers, captured by the metaphor of the ‘big man’ straddling private and public interests (Szeftel 2000b). Third, we demonstrate how publicly-available information from (digital) business registries, which have the advantage of near-universal coverage of the formal sector, can be deployed to investigate substantive questions in political economy.

Previous studies in this field have used the (quoted) value of firms on stock markets (Brugues et al. 2022) or declarations of the value of private wealth to investigate the effects of political office (Eggers and Hainmueller 2009; Fisman et al. 2014). In our case, direct monetary valuations of company worth are not feasible. While some company firm announcements list the initial equity value of the company, this measure is problematic – equity values are given in words, without indication of the currency, a significant proportion document no value at all, and we have no way to track company equity over time. Furthermore, Mozambique has just a handful of publicly-listed companies and access to accounting information of other large companies is generally difficult. Even so, it should be emphasised that in contrast to many other studies, a major advantage of our data is that we reconstruct the *complete* network of ties between individual business-owners as created through legal firm ownership. Consequently, we do not face problems associated with the presence of hidden components of the network graph or possible bias driven by non-random sampling that can severely distort network outcome metrics (for discussion

see Hsieh et al. 2018; Mastrobuoni 2015).

The remainder of the paper is organized as follows: Section 1.2 reviews relevant literature and develops our key hypotheses; Section 1.3 contains country background; Section 1.4 describes the main data sources and their treatment, including construction of the firm-owner network; Section 1.5 specifies the empirical framework; Section 1.6 provides results; and Section 1.7 concludes.

1.2 Politician-firm relations

The entanglement of public and private spheres has a long history (Della Porta et al. 1996; Winters 2011). Within economics, a primary focus of empirical scholarship has been the benefits that accrue to private firms from privileged access to political power. For instance, Fisman (2001) estimates the value of firms listed on the Jakarta Stock Exchange with connections to the former Indonesian President Soharto declined when rumours about the President's health emerged. Khwaja and Mian (2005) show that firms in Pakistan with directors who have participated in elections gain preferential access to credit from state banks, but have higher default rates; and in China, Truex (2014) identifies gains in financial returns to public Chinese companies whose CEOs become a deputy of the National People's Congress.

On the other side of such exchanges, empirical studies have confirmed that some holders of public office (present or past) reap personal benefits from their positions. Using India's Right to Information Act, Fisman et al. (2014) compare changes in wealth of parliamentary candidates, finding that winning candidates enjoyed up to six percent faster growth in personal assets compared to losers. Comparing British Members of Parliament (MPs), Eggers and Hainmueller (2009) show that Conservative MPs almost doubled their wealth compared to similar politicians who did not win a mandate. Yet, at the local level in Sweden, Lundqvist (2013) finds no significant monetary benefits to winning an executive (political) mandate.

From a theoretical perspective, a primary motivation for firms to engage in gainful mutual exchanges with politicians is to secure their assets and/or as a shield from com-

petitive market forces. In the absence of credible institutions and under the threat of political predation, companies face uncertainty regarding the security of their property rights, plausibly inhibiting further investment (e.g., North Sun, 05/09/2010 - 12:00). In such an environment, a second-best solution is for firms to agree to transfer some share of rents to politicians in exchange for protection (Haber 2002). This insight, however, is only of a very general nature. In practical terms, any agreement between firms and politicians is likely to be incomplete, investments are subject to risk, preferences will vary, and options for (extra-legal) enforcement differ across contexts. As such, economic theory suggests a diverse range of organizational and contract types may arise to govern the division of rents (see Carpenter et al. 2006; S. J. Grossman and Hart 1986; O. E. Williamson 1991).

Systematic evidence regarding *how* politicians derive private benefits from commercial firms remains limited (Chen and Kung 2019; J. P. Choi and Thum 2009). Nonetheless, existing studies do indeed point to a multiplicity of channels. Illegal bribes and gifts are an obvious one, but reliable information on such activities involving high-level politicians is not generally available beyond specific legal proceedings (Cheung et al. 2012; McMillan and Zoido 2004). An alternative and comparatively well-studied channel is through employment. Faccio (2006), for instance, defines politically-connected firms as those with politicians (mainly, members of parliament) or family members appointed as top officers in public companies, showing this is particularly prevalent in higher-corruption contexts. And Fafchamps and Labonne (2017) show that relatives of elected municipal office holders in the Philippines were able to find better-paid jobs than relatives of unsuccessful candidates.⁴

A drawback associated with these two forms of exchange is they generally fix the pecuniary benefit available to politicians *ex ante*. This may be suitable when returns from political largesse can be estimated with reasonable certainty (e.g., overpricing a procurement contract); but many commercial projects are not of this sort – returns (rents) are often stochastic and may only turn positive after some time lag. Also, since bribes

⁴ See also Ang et al. (2013), Mattozzi and Merlo (2008), and Schoenherr (2019).

tend to be one-off in nature, unless relevant exchanges can be synchronised, they are further subject to dynamic inconsistency – e.g., having received a bribe, the politician may renege on his support.

In addition to the above factors that may detract from fixing payments, it is not always the case that existing (or future) private property rights simply demand protection from predation (e.g., E. K. Choi 2009). In transition and developing country contexts in particular, allocation of *new* property rights may be at stake; and existing private sector entities may not be in a position to fully exploit them, such as due to financial, human or social capital weaknesses (or market failures). In these cases, political elites may not only have an interest in claiming some share of these new property rights (and associated future rents), but they also may have vital capital resources needed for these businesses to succeed. Thus, as Eswaran and Kotwal (1985) show in the context of share-cropping, co-investment or co-management contracts can be preferred when two or more parties hold distinct non-marketable inputs that generate superior rents when pooled. Similarly, agreeing to split profits into shares may be optimal in the context of significant production uncertainty and moral hazard (Stiglitz 1974).

This channel, whereby politicians take active ownership roles in the private sector, often together with other business partners, has been documented elsewhere. In the shift to capitalism among former Eastern Bloc countries, Staniszkis (1990) noted how new and old political elites were able to take advantage of the privatization of state assets, coming to straddle private and public spheres.⁵ For instance, Vladimir Potanin, a former acting First Deputy Prime Minister of the Russian Federation, helped design and then benefited from a loans-for-shares scheme, taking controlling stakes in twenty state-owned companies (Szelényi 2010). Similarly, Sonin and Lamberova (2018) use network analysis to reveal a significant association between the wealth of businessmen and their closeness to the inner circle of incumbent leaders in former communist countries. And in the case of palm oil plantations in Riau (Indonesia), Hamilton-Hart and Palmer (2017) show that co-investment by local political elites has constituted a robust institutional solution,

⁵ This is often referred to as ‘political capitalism’, associated with the phenomenon of market as opposed to state capture; see P. Mihalyi and Szelenyi (2019).

supporting expansion of the sector despite political fragmentation and legal uncertainty.

In the African context, including Mozambique (see Section 1.3), there is a long line of scholarship documenting the active business connections and associated private wealth accumulation of prominent politicians or family members(e.g., Daloz 2003; Szeftel 2000a; Twijnstra 2015; Wedeman 1997; Whitfield and Lars Buur 2014). Rijkers et al. (2017) consider firms owned by the family of former Tunisian President Ben Ali, which were confiscated following the Jasmine revolution. They show these firms accounted for around 16 percent of total net private sector profits, dominated by activities in sectors with high entry restrictions. And, as discussed by Abegaz (2013), a similar phenomenon emerges when political parties take controlling stakes in private firms. As the author notes with respect to the Ethiopian People’s Revolutionary Democratic Front:

”The fusion of control of state banks, ministries, regional governments, party companies and affiliated co-ops provided the ruling party myriad instruments to hamstring the *bona fide* private sector by frustrating the emergence of contestable credit, fertiliser, seed, and output markets.”⁶

Other related channels also have been identified. Della Vigna et al. (2016) show how firms in Italy shifted advertising spending to the country’s major television network, owned by the media entrepreneur Silvio Berlusconi, during periods when he held political office. The authors estimate the additional revenue earned by the network was in the order of billions of Euros and was driven by firms in more regulated sectors, implying advertising firms sought to curry political favours. And Markussen and Tarp (2014) find that households in rural Vietnam with relatives in a position of political or bureaucratic power tend to invest more in land improvement, likely due to strengthened *de facto* property rights.

Following the above, our interest in this study concerns how politicians may leverage public office for personal gain in their capacity as business owners, be it as active partners or as sole-owners. Furthermore, as hinted, exchanges rarely take place on an atomistic (barter-type) basis; rather, they tend to involve sustained relationships between actors

⁶(p. 1481)

located within networks. This recommends us to adopt a broad focus on politicians' business networks, from which three considerations follow. First, the strategic position of individuals within networks of relationships can represent an important source of advantage or value. As Burt (2000) puts it:

"Certain people or certain groups are connected to certain others, trusting certain others, obligated to support certain others, dependent on exchange with certain others. Holding a certain position in the structure of these exchanges can be an asset in its own right. That asset is social capital, in essence, a concept of location effects in differentiated markets."⁷

Second, while accumulation of business network capital may be of value *sui generis*, it is likely to be a means to pecuniary ends. A clear positive relationship between measures of network position (centrality) and final economic outcomes is found in various contexts.⁸ Mastrobuoni (2015) shows a strong causal effect of the closeness centrality of individuals within the Italian-American mafia network on the value of their private housing, a proxy for economic status. In the management literature, many studies find a positive association between firm performance and network centrality (for a review, see Wang et al. 2015). For example, among public Chinese firms, Tsai et al. (2019) show that a higher centrality of the firm leadership within political networks is associated with greater innovation input, plausibly driven by privileged access to government subsidies.

Third, the structure of networks can also be important for the maintenance of social order. A large number of theoretical and empirical studies investigate how cooperation is sustained without recourse to external or third-party enforcement (e.g., Matthew O Jackson, Rogers, et al. 2017). Broadly speaking, a key insight is that efficient cooperation is achieved when individuals have multiple close ties in a shared network, in part due to the risk of reputational loss associated with deviating from expected behaviour. Chandrasekhar et al. (2018) extend this and show that exchanges involving at least one actor with a relatively high network centrality are more likely to be cooperative. And Matthew

⁷see also (Nahapiet and Ghoshal 1998, p. 247).

⁸ We discuss specific network measures in Section 1.4.

O Jackson, Rodriguez-Barraquer, et al. (2012) argue that specific types of tight social cliques emerge endogenously as they retain a credible threat of dissolution in the face of opportunistic behaviour. Thus, to facilitate repeated gainful exchanges between politicians and other business owners, these actors may be connected within a dense network of relationships spanning other third parties.

In sum, we have two main hypotheses. On the one hand, reflecting the channel of direct rent-sharing, access to public office may enable politicians to obtain private gains by accumulating ownership stakes in private firms. On the other hand, so as to augment their business network (social) capital and bind themselves more credibly to other business owners, they may seek to strengthen their strategic location within the network of formal business owners, such as by enhancing their network centrality.

1.3 Country background

Historical context

Modern-day Mozambique is a large country occupying over 2,500 kilometres of Indian Ocean coastline, with borders to South Africa, Zimbabwe, Malawi, Zambia and Tanzania. Even before the arrival of Vasco da Gama in 1498, territories in Mozambique have long served as gateways to the ‘interior’ of East and Central Africa, as well as a conduit for trade in whatever tropical commodity happened to be in demand (e.g., gold, ivory, slaves, cotton, cashew). And while the Portuguese crown was already making territorial claims in Mozambique by the early 16th century, it was not until around the 1930s that Portugal was able to exercise effective control of what was and continues to be an ethnically- and geographically-diverse territory (Newitt 1995).

During the height of colonial rule, Mozambique’s formal economy remained reliant on the supply of cheap raw materials to Portugal (e.g. sugar (Jones and Gibbon 2022)) and provision of labour and transport services to neighbouring countries (e.g., Rand gold mines; First 1985). Whatever infrastructure existed ran East-West (from ports to inland frontiers), while the country remained economically disintegrated in the North-South di-

mension. As such, the mainly agricultural-based local economy remained under-developed and exploited. In other words, right up to Independence, the economy was reliant on a few specific commercial relationships of an external nature in which native Mozambicans had little or no say.

Mozambique's transition to Independence was late, rapid and messy. The final 15 years of the colonial period were characterised by large inflows of Portuguese settlers, yielding some agricultural and industrial progress. However, inspired by success elsewhere on the continent, this period also saw the start of an intense struggle for liberation, initiated by the Front for the Liberation of Mozambique (FRELIMO) from a base in Dar-es-Salaam, Tanzania. Originally constitutionalist and non-violent, FRELIMO opted for armed struggle in 1964. A decade of violent conflict followed until Independence was suddenly announced in 1975, following the Carnation revolution in Portugal in 1974. This led to an exodus of about 80 percent (several hundred thousand) of the Portuguese settlers, who had dominated managerial and technical positions (including taxi drivers in the capital city). This exodus devastated the public administration and led to an almost total collapse of industry and commercial agriculture, leaving millions of peasants without inputs or supplies. This challenge was compounded by regional tensions with the apartheid states of Rhodesia and South Africa, as well as Cold War geopolitics. These left the new country little room for manoeuvre, either politically or economically, and turned out to be very costly, illustrated by the economic and military impact of Mozambique's decision to enforce United Nations sanctions against Rhodesia (Minter and Schmidt 1988).

In common with other liberation movements, the vision adopted by FRELIMO for a newly autonomous Mozambique was one of state-led socialism. Under the Presidency of Samora Machel, the FRELIMO leadership initially enjoyed a high degree of legitimacy and, arguably, the underlying social contract associated with socialism has provided the only credible unifying vision for the country to the present day. Not unlike Vietnam during the mid-1970s after the defeat of US forces, the atmosphere in Mozambique at the time was upbeat. FRELIMO optimistically declared that the coming decade would see 'the victory over under-development'. In retrospect this was naïve, but to many at the

time it appeared self-evident.

Post-independence challenges and ruptures soon mounted. In particular, a series of misguided and overly-ambitious economic choices followed the Third FRELIMO Congress in 1977, in which Marxist-Leninism was formally adopted, prompting the creation of state farms and forced resettlement of large numbers of people into communal villages. A similar policy had been imposed by the Portuguese, albeit for different reasons. So, rather than winning support among the peasantry, FRELIMO started to lose it. At the same time, under Rhodesian and South African support, the Mozambique Resistance Movement (MNR) emerged as a violent military force. MNR incorporated unhappy dissidents with roots predominantly in central Mozambique, where religious and ethnic grievances were both common and deep, and gradually absorbed others, who became increasingly critical of FRELIMO's policy stance.

With the Independence of Zimbabwe in 1980, hopes were high that a turnaround was possible. Yet, now backed by South Africa, MNR (renamed Renamo) slowly but surely undermined FRELIMO's nation-building efforts. On the other side, FRELIMO cadres remained steadfast in criminalizing so-called insurgents and their supporters. A brief glimmer of optimism occurred with the signing of the Nkomati Accord between Mozambique and South Africa in 1984. Yet, large-scale destruction of infrastructure and killings continued, with support from South Africa, and a political settlement was not on the cards before the end of Apartheid and fall of the Berlin Wall. In October 1992, FRELIMO and Renamo signed the Rome General Peace Accords, finally ending decades of gruesome conflict that had left millions dead or displaced and the economy on its knees.⁹

Elite control and corruption

Even before the peace accords, FRELIMO had begun to march back on its socialist vision. This was precipitated by the collapse of former allies in Eastern Europe and elsewhere on the global arena, as well as the economic consequences of the ongoing war,

⁹ For a review of recent literature on state formation and the legacies of violence in Mozambique see Vines (2020).

which reached a historical low-point in 1986. Negotiations for financial support from the Bretton Woods institutions, as well as a range of western donors (in addition to the Nordics, which were present from very early on), began after the signing of the Nkomati agreement. Subsequently, the Government agreed a comprehensive deal with the Bretton Woods institutions and the Paris Club creditors in 1987. This introduced a five-year Economic Rehabilitation Programme (PRE), which entailed a drastic U-turn in economic policy, while the FRELIMO party continued to run along essentially the same socialist organisational lines.

A key leg of the PRE was dealing with state-owned enterprises via privatization or closure. Investigations of this process, which according to Cramer (2001) was one of the most extensive in sub-Saharan Africa by number of transactions, largely agree it did little to curtail the influence of politics within the economy. Rather than allowing a nascent independent private sector to flourish, privatizations represented a ‘marriage between the politician and businessman’ (Pitcher 2002, p. 118), shifting economic power away from the state and into the hands of well-connected politicians or their associates.¹⁰ Echoing experiences in Eastern Europe, Sumich and Honwana (2007) conclude that privatization:

“[...] was not a neutral, technical measure as the World Bank and the IMF seemed to naïvely assume, but a deeply political process where FRELIMO directed events as much as possible to assure the continuing support of some elements of older constituencies and create new ones”¹¹

This view of high-ranked members of FRELIMO as central nodes linking economic and political spheres of power constitutes a defining feature of Mozambique’s post-war development trajectory (see also Cortês 2018; Pitcher 2017, 2002). Related to this, three further characteristics merit note. First is the almost complete absence of an independent domestic capitalist class with bases of power outside FRELIMO. Second, perhaps symptomatically, there has been a general lack of open contest (competition) in political

¹⁰ This is not to say that prior to privatization links between business and politics were absent. Indeed, concerns with corruption were already prevalent in the speeches of Samora Machel in the early post-Independence period, and some ministers were reprimanded for using state enterprises for personal enrichment (Stasavage 1999, e.g.,).

¹¹(p. 19). For the World Bank’s perspective on privatization, see Landau (1998).

and economic life. To illustrate, the current electoral system is based on closed party candidate lists, which means that while party members are in principle accountable to the people, they are in reality foremost accountable to their party, both for their election and to gain access to business opportunities (among FRELIMO members). Partly as a consequence, competition *within* FRELIMO is fierce, meaning that managing internal tensions and interests often dominates public policy-making. In the case of industrial policy, for instance, this has produced a mixed and piece-meal approach, with no clearly articulated or commonly-agreed vision (e.g., Buur et al. 2012; Whitfield and Lars Buur 2014).

Third, while tight links between politicians and businesses in Mozambique are neither all illegal nor necessarily corrupt, they have presented opportunities for abuse that have been seized in some instances. The Indian Ocean Newsletter (29 June 2007) characterised these political-business connections as follows:

“The business networks and the ruling FRELIMO party have been closely interweaved for decades, leading to a risk of insider trading at all levels of power. Support or co-option between entrepreneurs and government officials puts the companies that do not have the benefit of this kind of political protection into a difficult position ... [giving] the Mozambican ruling class an air of a set of political-trading dynasties”.¹²

Salimo et al. (2020) provide a detailed case study of how political insiders, as well as the investment arm of the FRELIMO party, were able to benefit from the domestic allocation of natural gas from Sasol, often via partnerships with other foreign investors.

In sum, the historical legacies of exploitation and under-development in Mozambique created enormous challenges for political leaders following Independence. At the outset, the dearth of both domestic private financial capital resources and business experience provided one motivation for the government’s pursuit of state-led economic development in the late 1970s and early 1980s. However, despite the failure of this programme, nothing resembling a capable or independent private sector was in place when Mozambique began

¹² See www.mol.co.mz/noticias/2007/ion0629.html.

to adopt market-based economic reforms in the mid-1980s in response to external pressures led by the Bretton Woods institutions. Put differently, despite the embrace of a market economy, it was not clear who would be the new captains of industry or which industries might drive economic growth. The country's subsequent experience reveals that political insiders have occupied this space, creating a tight nexus between party political and private economic power.

1.4 Data sources and construction

In the remainder of the paper we undertake a quantitative investigation of the degree to which political office holders in Mozambique leverage their positions to accumulate influence in the private business arena. This section presents our two main data sources, which we merge to construct a panel dataset covering all registered business owners and politically-exposed persons (PEPs) over each 5-year period from 1985-2019, where each period coincides with the national election cycle (from 1994 onwards).

PEPs register

We follow the Financial Action Task Force on Money Laundering (FATF) and construct a list of Mozambique's post-Independence PEPs, defined as holders of high executive office or important political party officials. We operationalize the former as individuals holding the office of Provincial Governor, Vice-minister, Minister or President. For important political party officials, we focus on individuals elected to the highest decision-making body of the ruling party, the Central Committee (*Comité Central*, CC) of FRELIMO. Reflecting its socialist heritage, FRELIMO has held a national party congress every two to six years since 1962. Members of the CC are elected at each congress, comprising provincial representatives (nominated by prior provincial party congresses) as well as central level members. While the composition and size of the CC has changed over time, the most recent congress covered by our data, held in 2017, elected 180 committee members of whom 129 were provincial representatives, plus 18 replacements.

There is no single public record of all historical executive mandates or CC members. Consequently, using a wide range of historical news articles and official publications, we hand-collected an extensive list of PEPs over the period 1975-2019, recording the names of individual office holders, the type of office held, and years in power (see Appendix 1.D for a full list of sources). Although this list may have some gaps, we were able to identify all executive officers (ministers, governors etc.) in all governments since 1975. Membership of the CC is more challenging. For all 11 congresses held from 1962-2019, we were able to identify the members of the Political Committee (Politburo), which is the highest elected central body of the party and forms part of the core CC structure. In addition, for 5 of 11 congresses we have the full list of members elected to represent central functions; and we have the full list of the further provincial representatives for five of the eleven congresses.

To ensure consistent treatment of the same individuals, some of whom appear with different spellings (e.g., with or without middle names), we standardize each name in the PEP database. After doing so, we identify 825 unique individuals (PEPs).¹³ Since numerous PEPs have held multiple posts, either at the same or at different points in time (e.g., many ministers are CC members; and presidents typically serve two terms), we observe a larger number of distinct mandates than unique individuals. Table 1.1 summarizes the number of observed PEPs for each type of mandate in each period. Here, each mandate is defined by at least one mention as Minister, Vice-Minister, Governor, President, CC member or Politburo member in a 5 year period. Figure 1.1 plots the distribution of individual tenure, defined by the first and last years in which they held political office. The left-hand side plots the cross-section cumulative distributions of first and last years, while the right-hand side shows the cumulative distribution of the difference (total years spanned) for each PEP. The latter indicates that around 25% of PEPs span more than 10 years of activity, but a small number of party grandes have been active for more than 30 years.

¹³ As we describe below, we exclude here individuals who were PEPs before the 1980s but show no activity in either the PEP or firm register *after* 1985. This leads to the removal of 158 individuals from the initial list.

Table 1.1: Frequency of individuals in each PEP category, per period

Type of office	≤ 1984	'85-'89	'90-'94	'95-'99	'00-'04	'05-'09	'10-'14	'15-'19	All
Political Bureau	20	17	16	17	25	29	24	25	61
Central Committee	148	252	270	174	177	180	71	222	640
Minister	40	60	45	34	40	49	54	39	209
Vice-Minister	10	13	7	15	17	18	16	23	87
Governor	10	14	4	5	11	15	15	12	60
Any office	170	294	301	213	225	236	134	270	830

Source: authors' compilation from archive material.

Note: individuals may hold offices across multiple office categories in each period; table only covers PEPs active from the 1980s onwards.

Company register

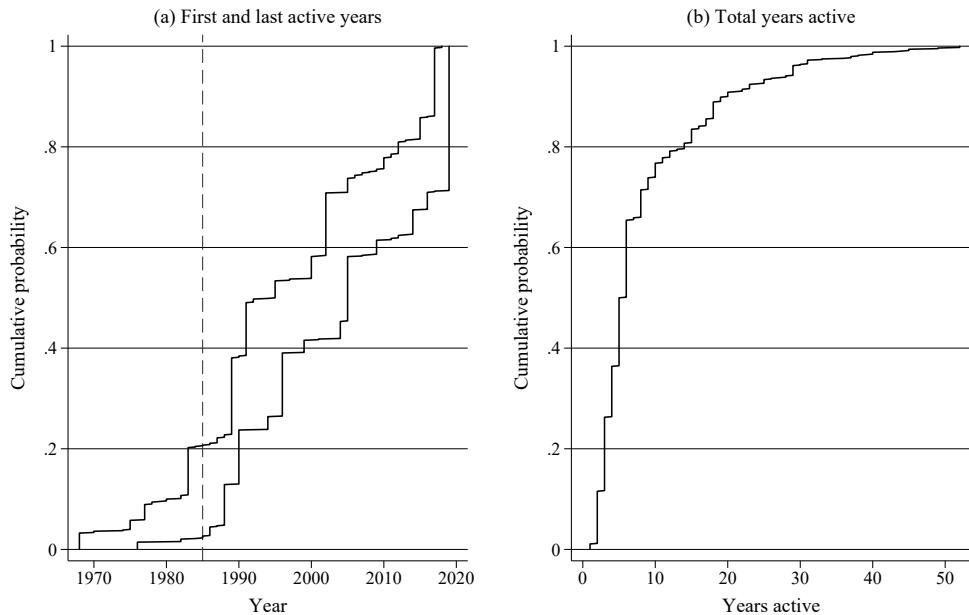
In keeping with the legislative structure inherited from Portugal, the constitution or modification (e.g., closure) of all non-natural legal persons (mainly enterprises, but also cooperatives, political parties etc.) in Mozambique must be published in the official gazette, known as the *Boletim da República, Serie III* (BdR3).¹⁴ Started at Independence in 1975, the registry provides a complete public list of all firms that have been formally established in the country. The published BdR3 documents are available for review at the National Archive or online (since 2006) and Appendix 1.D provides an example of one such entry.¹⁵

Entries in the gazette record the official publication of information transcribed manually at notary offices around the country. While no official digital repository of the underlying data exists, a local private company (Pandora's Box Lda.) has sought to digitize all laws and announcements published in the various series of the *Boletim da República*, including BdR3. Their aim was to allow users to search for key words (e.g., firm names) and then access the relevant material quickly and directly based on scanned copies of the original publications. In the case of legal entities, the searchable index of the BdR3 is extensive and contains most of the information contained in each published announcement.

We leverage this digitalized information to construct a consistent register of compa-

¹⁴ This practice was maintained in Portugal until 2006, when the third series of the equivalent gazette (the Diário da República) was discontinued and replaced by a digital registry.

¹⁵ See: www.portaldogoverno.gov.mz/por/Governo/Legislacao/Boletins-da-Republica.

Figure 1.1: Length of PEP activity (in any office)

Source: authors' compilation from archive material.

Note: panel (a) shows the cross-sectional cumulative distributions of first and last years in which individuals hold/held PEP mandates; panel (b) is the cumulative distribution of number of years active, defined as the difference between the last and first year in office, by individual; we do not assume individuals hold office in all intervening years.

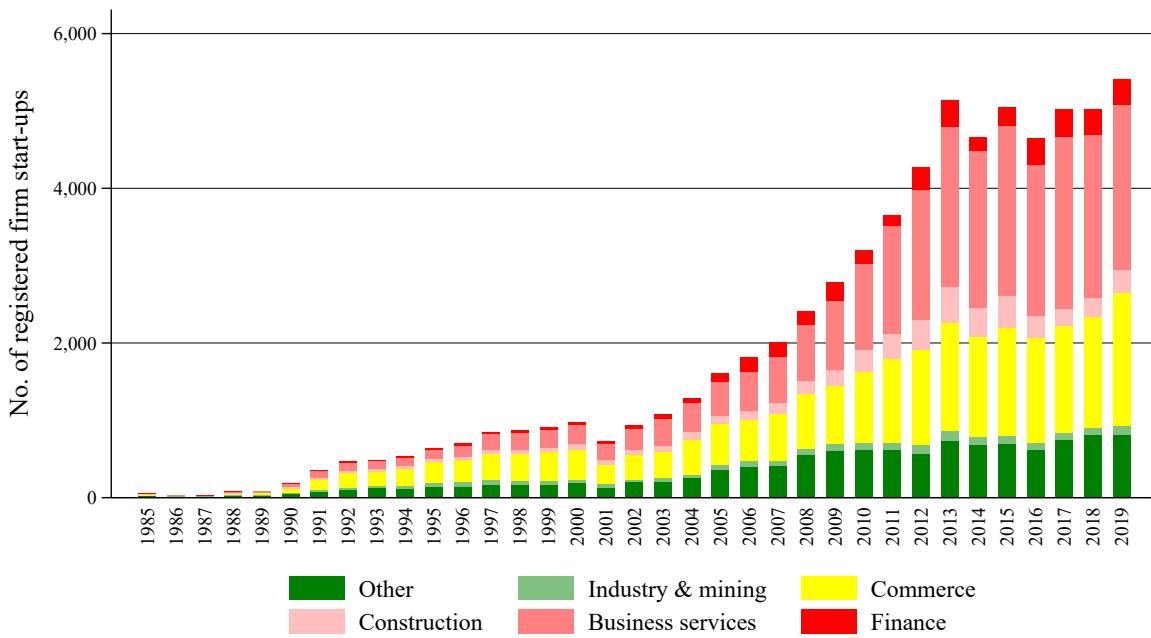
nies. To do so, we implemented a web-scraping procedure to parse through the internal index of BdR3 announcements in the Pandora's Box database and fetch all associated data fields. The fields associated with each index provide (at least) the name of the legal entity to which the announcement refers ('*Nome da entidade*'), the type of announcement ('*Anúncio de*') and the publication reference ('*Publicado em*'). As might be expected, there are both different types of legal entities, ranging from single-person companies to political parties, as well as various types of announcement. In each case, different additional information is provided. For the present purposes, we focus primarily on announcements of the constitution (matriculation) of the three main classes of limited liability companies, namely: firms registered under sole-ownership ('*Sociedades unipessoais*'), joint-stock firms ('*Sociedades por quotas*') and public companies ('*Sociedades anónimas*'). In addition, we retain information on other types of entities and announcements, which we subsequently deploy as control variables (see further below).

Having scraped the data in raw form, we cleaned it. First, we normalized the firm

names to identify unique entities. Second, to make our subsequent analysis of the structure of the business network tractable (see below), we mapped all documented information about each firm to a single entry. This information includes: (i) the founding year of the firm, given by its first entry in the register; (ii) the province of registration; (iii) all documented owners of the firm, regardless of the time they became owners; and (iv) the sectoral classification of the firm, identified from key words in the founding mission statement (*objecto social*). Where we find matches to multiple keywords, we allocated the firm to several industries. (The mapping of key words to sectors is provided in Appendix 1.D).

In setting up the database in this way we lose some specificity about the timing of ownership changes. To give an example, if a company *A* is registered in 2005 with four owners and documents an alteration of two additional owners in 2007, we define *A* as a firm with six owners founded in 2005. However, around 90% of all firms either have no alterations or only have alterations occurring within two years of founding (i.e., within a 5-year period).

To give a sense of the constructed firm register, Figure 1.2 plots the number of companies founded per year across different sectors. It shows that trade- and business services firms represent a significant share of firms founded from 2006. Even though the extractive sector made an important contribution to economic growth over the last decades (Wolrd Bank 2017), the share of newly-registered mining-related firms has remained small. Appendix Figure 1.B.1 plots the number of company announcements of different types in each year – the vast majority of firms appear only once in the register; and hardly any firm closures are documented, likely reflecting misreporting. Appendix Figure 1.B.2 further counts the number of firms founded in each of the three classes of limited liability firms in each year. The majority of firms are listed as joint-stock types, which can have multiple shareholders, although sole-owner entities (*sociedades individuais*) have grown rapidly in number since 2010.

Figure 1.2: Number of companies founded per year

Source: authors' calculations from firm registry.

Note: the figure indicates the number of companies founded per year in each sector in the official gazette.

Company-owner network

To compare business affiliations among individuals (natural persons), we transposed the information from the company register into a unique register of owners. For each individual, this lists all firm affiliations for which they are identified as a beneficial owner. To do so, we standardized the names of individuals so as to address problems of misspellings and inconsistent inclusion or orderings of middle names. To give one example, we found the name of a former prime minister transcribed in the business register under seven different middle name combinations.

Using this cleaned register of owners, we then constructed the network of how individual business owners are connected through different companies. As we describe below, this permits assessment of the strategic position or relative importance of each individual within the formal business network – e.g., through common shareholders and their associated connections. To construct this network we defined each individual as a node and, for each node, we defined as direct connections all other nodes represented by individual shareholders (partners) in the same firm(s). As such, the edges of the network

graph represent different firms – i.e., individuals are connected to each other as common shareholders (partners) in firms.

It merits emphasis that, consistent with our interest in the accumulation of private wealth by PEPs, our focus here is on the network of individual business-owners. In Mozambique, these are by far the most prevalent legal entity with stakes in companies. Looking across all firms in the register, 82% are entirely owned by natural persons on establishment; and just 3% are fully owned by non-natural persons (e.g., other corporations, political parties); see also Appendix Figure 1.B.3. Put differently, natural persons account for around 95% of all owning entities in the register. Thus, our analysis refers to the dominant set of relationships structuring the formal business sector.

Network outcomes

With respect to the main outcomes of interest, Section 1.2 developed two general hypotheses consistent with private rent-seeking by politicians through interests in businesses. These are that, compared to individuals who do not hold public office, PEPs: (H1) display a higher propensity to accumulate ownership stakes in private firms; and (H2) enhance their strategic positions within the firm-owner network.

Table 1.2 summarises a range of metrics, where i indexes individuals and t time periods. Measurable outcomes associated with our first hypothesis (H1) derive relatively straightforwardly from the firm register and capture the scope of private business interests per individual. As set out in panel (a), quantifiable outcomes include the number of firms in which the individual currently holds a beneficial interest, or the sum of stakes held. With respect to the latter, the BdR3 does not provide consistent transcribable information regarding the exact partnership quotas held by each individual. Thus, for simplicity, we presume equal stakes are held (e.g., 1/3 each for a three-person partnership), meaning this measure represents the ratio of the number of firms in which the individual has an interest and the average number of partners in these firms.

The second hypothesis (H2) refers to the business network capital of individuals. A wide range of metrics have been proposed in this regard, reflecting different dimensions of

Table 1.2: Summary of business and owner-network outcome measures

Type	Name	Description	Definition
(a)	Activity	Owner	$c_{it} > 0$
	Multi-firms	Partner in more than one firm	$c_{it} > 1$
	Firms	Number of companies in which individual is a partner	c_{it}
(b)	Quotas	Partnership shares owned by individual	$c_{it}^2 / [c_{it} + d_{it}(1)]$
	Size	Zero business partners	$c_{it} > 0 \wedge d_{it}(1) = 0$
	Degree	Unique direct partners	$d_{it}(1)$
(c)	Rel. 2nd degree	Unique contacts per 1st degree contact	$d_{it}(2) / d_{it}(1)$
	Rel. 3rd degree	Unique contacts per 2nd degree contact	$d_{it}(3) / d_{it}(2)$
	Structure	Inverse av. distance to contacts (up to 3rd degree)	$(\sum_{n=1}^3 d_{it}(n)) / (\sum_{n=1}^3 n \cdot d_{it}(n))$
(d)	Brokerage	% of direct contacts not mutual contacts	$2 \text{Godfather}_{it} / [d_{it}(1) \cdot (d_{it}(1) - 1)]$
	Broker	Brokers at least one relationship betw. partners	$\text{Godfather}_{it} > 0$
	Combined Decay	No. structural holes spanned (direct partners) Weighted sum of contacts (up to 3rd degree)	$\text{Godfather}_{it}; \text{equation (1.1)}$ $\sum_{n=1}^3 0.5^n \cdot d_{it}(n)$

Source: own elaboration.

social capital. As discussed widely, a critical distinction is often made between measures of the *size* of an agent's network versus the *structure* of that network. With respect to size, it is intuitive that individuals with a small number of connections (in our case, partnerships) should have relatively less capacity to exert influence over or place themselves at advantage in socially-mediated exchanges relative to individuals with a larger number of connections. Equally, a larger number of network connections should provide individuals with better access to flows across the network (e.g., information; business opportunities).

Various size-type measures are summarised in panel (b), starting with the simple binomial measure of being isolated, defined as individuals with one or more firms but no business partners. We also define $d_{it}(n)$ as the total number of ties of degree (distance) n to node i . The first degree, $d_{it}(1)$ also known as degree centrality, thus gives the count of node i 's direct ties (business partners); second degree is the number of ties of each of i 's direct ties (business partners of immediate partners), etc.. For reasons of computational complexity, we only consider ties up to third degree (i.e., business partners of all partners' partners).

In addition to network size, the quality of connections in a network matters. Burt (2000) distinguishes between closed network structures, where the density of connections is high, versus more open networks containing 'structural holes'. A closed or dense structure is often considered to be better able to assure the reliability of information flows and enforce social norms, such as by facilitating effective sanctions (Granovetter 2017). However, a more open structure, in which certain individuals broker relations between others, creates opportunities to control exchanges and access non-redundant information. Matthew O. Jackson (2020) illustrates the concept of brokerage capital using the fictional character from the Godfather movies, a figure who never extends favours directly, but is able to collect favours himself by connecting others who don't know each other. This is similar to coordination or leadership capital, which describes the ability to be the 'friend-in-common', who can connect an individual to someone unknown, which can be useful when a group needs to act in coordination (Gould 1996; Stovel and Shaw 2012).

Thus, panel (c) of the table summarises specific metrics of the structure of the network

for each individual. These include: the average closeness of their ties up to third degree (capturing the density of connections), where a value of one implies all ties are of first degree only; and, to capture brokerage, we calculate the share of direct ties who themselves are not mutual contacts. Thus, if individual i has only one business with three direct partners, by definition all three partners have mutual ties (through the same firm), so i cannot broker any relationships in the network.

Finally, panel (d) describes two synthetic measures that combine aspects of *both* network size and structure. The first is the so-called Godfather centrality, which counts the absolute number of relationships among a node's direct partners that it brokers, defined as:

$$\text{Godfather}_{it} = \sum_{\forall k} \sum_{\forall j > k} g_{ikt} g_{ijt} (1 - g_{kjt}) \quad (1.1)$$

where g_{ijt} takes a value of one if there is a direct tie between nodes i and j at time t . The second is the decay centrality of a node. In this measure, both direct and indirect connections within the network are considered. And following Matthew O. Jackson (2020), we calculate the decay centrality using a pre-defined parameter $p = 0.5$, which weights the value of each connection between two nodes, reflecting the decay in information quality or availability as distance increases (see also Tsakas 2019).

Appendix 1.E provides an illustrated example of how different network measures capture distinct aspects of network position. Measures of the sort proposed here have been widely applied before. Reddy (2022), for example, analyses the connections between the top 125 public companies in South Africa created through common board members (interlocking directorships) over the period 1993-2018, showing a fall in average degree centrality as the network became more fragmented. And, similar in spirit to our own analysis, the author further investigates the determinants of differences in centrality, showing that the number of PEPs on the firms' board is a key predictor of being a more central firm.

Merged panel

Pulling this together, we merge the PEP database with the owner register and associated derived outcomes, forming a longitudinal dataset at the individual-level. Due to the slow-moving nature of political mandates and personal business outcomes, we construct a five-year panel starting in 1985 and ending in 2019. This periodicity is chosen to broadly coincide with the national election cycle – the first multi-party elections were held in 1994 and the new government took office in 1995. Since then, elections have been held every five years.¹⁶ As such, we take a snapshot of the owner-network data at the end of each 5 year period. In this way the attributes of individuals (nodes) change over time – i.e., as new firms are founded, additional edges (and nodes) are added to the network. We combine this with details of all PEP mandates held during the same period. Information on firms and political offices held before 1985 are retained, and used later as baseline control variables. And with respect to individuals who only appear in one or other register after 1985, we set all relevant variables to zero for earlier periods.

Due to the long time span covered by our data, there is a risk we include individuals who have retired from business or politics or even passed away. Since Mozambique does not have a comprehensive register of influential persons (a “who’s who”), we have no way of manually correcting the data for such exits. Instead, we remove all unique firm owners who: only enter the register before the 1980s, have no later entries and also do not appear as a PEP; similarly, we remove all PEPs who only had mandates before the 1980s and show no firm or political activity during the focus period. This procedure excludes a total of 2,884 individuals, less than 2.5% of the original observations.

Table 1.3 gives an overview of the structure of our full dataset, labelling observation periods by their final year. Panel (a) shows we have a total of 109,547 unique firm owners, which together with the 825 PEPs (also Table 1.1) yields 110,057 unique individuals, implying 510 of the PEPs (about 60%) are not observed in the firm register (also Appendix Table 1.A.1). Panel (b) summarises the sub-sample of what can be defined as active

¹⁶ Prior to 1983, FRELIMO considered itself a Marxist-Leninist party, meaning private business activity was limited. Also, weak documentation before 1985 makes it difficult to define a perfectly-consistent list of PEP mandates for this period.

Table 1.3: Panel data descriptive statistics

		1989	1994	1999	2004	2009	2014	2019
(a) All persons	PEPs	830	830	830	830	830	830	830
	Owners	109,566	109,566	109,566	109,566	109,566	109,566	109,566
	Total	110,078	110,078	110,078	110,078	110,078	110,078	110,078
(b) Active	PEPs	316	414	446	588	627	676	830
	Owners	2,042	7,597	17,929	30,150	49,937	80,158	109,566
	Total	2,352	7,948	18,269	30,574	50,362	80,584	110,078
(c) Outcomes	Companies	1.30	1.35	1.40	1.44	1.51	1.57	1.60
	Multifirm	0.18	0.19	0.21	0.22	0.24	0.26	0.27
	Avshare	0.34	0.38	0.38	0.40	0.43	0.48	0.52
	Nonisolate	0.46	0.47	0.49	0.50	0.50	0.47	0.44
	Closeness	0.60	0.56	0.55	0.53	0.49	0.46	0.43
	Brokerage	0.05	0.06	0.06	0.06	0.07	0.07	0.06

Source: authors' estimates from merged panel data.

Note: panels (a) and (b) report counts of unique individuals, where panel (b) excludes individuals not yet appearing in the PEP list or firm registry; panel (c) reports means for active firm owners, Godfather and Decay centrality metrics are trimmed at their respective 95% percentiles to reduce the influence of positive outliers.

individuals. For PEPs, these include individuals from the first time they hold office onwards. Similarly, for firm owners, individuals are classed as active from the first period they become a firm owner. And the final row in panel (b) applies a slightly expanded definition, defining individuals as active if they are active on either of the previous two definitions.

Panel (c) summarises period averages for our main outcomes, focusing only on active business owners.¹⁷ A few observations merit attention here. First, throughout the period, the vast majority of business owners hold stakes in just one firm – i.e., less than one in three owners are engaged in multiple firms; thus, the average number of firm stakes held is less than two. At the same time, the majority of businesses are established in partnership with other natural persons. Less than one in three firm owners are ‘isolates’, with no connections to other business owners. So, the average firm owner has a direct tie to about 4 other owners (first degree centrality); and the weighted average number of connections is close to seven (decay centrality). Last, the structural position of being a broker is comparatively rare and stable. Around 6% of all firm owners broker at least one relationship amongst their business partners, translating into a mean Godfather centrality

¹⁷ For individuals not (yet) present in the firm register, all outcomes are automatically zero. See Appendix Table 1.A.1 panels (b) for period means for both the full sample and PEP sample.

measure of less than two.

These statistics suggest the business-owner network is rather fragmented, containing many nodes with no connection pathway in the network. And, as demonstrated by the growing share of unconnected owners, this fragmentation has been increasing over time. But this is not the complete picture. The data points to a key distinction between lower- and higher-connected individuals. Appendix Figure 1.B.4 plots the share of business owners according to the highest degree of their connections in the network (up to a maximum of three). It shows that while a majority has either no connections or only direct business ties (e.g., an isolated family firm), the share of business-owners with connections of degree three or more is material and has expanded, peaking at 42% in 2005-2009.

This insight is substantiated by the presence of a very large inter-connected core to the ownership network. In the last 5-year period (2015-2019), while the network graph contains over 40,000 components (unconnected sub-networks), just one of these dominates, connecting 34% (37,757) of all business owners. The remaining components are not large in size, connecting at most 83 nodes to each other. Appendix Figure 1.B.5 plots the share of nodes affiliated with the first and second largest component in each period. It shows the presence of just one substantial ‘core’ business network in the private sector in Mozambique; and outside of this group there exists no other sizeable group of connected owners. The largest component of business owners contains around 400 times more owners than the second largest.

Finally, while the various outcomes capture distinctive aspects of business activity, they are not mutually orthogonal. As per the pairwise correlation matrix in Appendix Table 1.A.2, which refers only to active firm owners, many outcomes are strongly positively associated – e.g., individuals with more companies typically have more business and are more likely to broker a relationship between others. Consequently and to facilitate presentation, we construct a synthetic measure of business network capital, defined as the score of the first principal component for the full set of outcomes, calculated from observations of active business owners over the full period. Scores are subsequently attributed to all observations and transformed using a minmax procedure to range from 0 to 100.

By construction, this final score is zero for individuals with no current ownership stakes. We predominantly focus on this synthetic metric in the main text but, as evidenced in the Appendices, results carry over to most underlying outcomes.

1.5 Empirical framework

The previous sections described the data and the main outcomes of interest. We now set out our strategy to estimate the (causal) effect of holding political office on private business success. To do so, two key issues need to be tackled. Namely: (i) the composition of the counterfactual sample; and (ii) our specification and choice of estimator. We discuss each in turn.

Counterfactual sample

With respect to our two focus hypotheses, definition of the relevant treatment group is straightforward, being individuals classified as politically exposed persons. For the time being we can consider this a monotonic property – i.e., once classified a PEP they remain a PEP going forward (see below for elaboration). However, against whom the outcomes for these PEPs should be compared is not so obvious.¹⁸ To see this issue clearly, Table 1.4 tabulates individuals by their current PEP and firm-owner status, including within each group a ‘never’ category that contains individuals who either never become a PEP or never own a firm. The table covers the entire period, such that most unique individuals appear in different cells of the table as their status changes.

Three points emerge. First, as per empty cell (a), our data only contains individuals who eventually become at least a firm-owner or a PEP – i.e., our sample is restricted to individuals who demonstrate fulfilled revealed preferences to engage in politics, formal business or both. That is, our target population excludes the majority of the population. Second, most observations occur in row (1), being individuals with no fulfilled preference

¹⁸ Minimally, our counterfactual or control group must contain some individuals who are not currently PEPs. Also, since our focus hypotheses pertain to business activity outcomes, we should cover some individuals who (go on to) own firms.

Table 1.4: Count of observations classified by PEP and firm status, all periods

PEP status	Firm-owner status			Total
	(1) Never	(2) Before	(3) Current	
(1) Never	0 (a)	468,694 (b)	296,042 (c)	764,736
(2) Before	2,679 (d)	622 (e)	836 (f)	4,137
(3) Current	905 (g)	267 (h)	501 (i)	1,673
Total	3,584	469,583	297,379	770,546

Source: authors' estimates from merged panel data.

Note: table counts individuals in each period by PEP and firm status; 'never' refers to individuals not appearing in a given registry over the entire period 1985-2019.

for politics. But, third, since all cells in columns (1) and (2) refer to individuals not yet in the firm register, only a minority (40%) of all observations in the balanced panel map to non-zero outcomes on any measure. It follows that, to ensure meaningful variation in *both* PEP status and business outcomes, observations in cells (f) and cell (i) must be included. These sub-groups represent minimal feasible definitions of the treatment and control groups respectively, equivalent to comparing current firm-owning PEPs to all other current firm-owners who later become PEPs.

Although admissible, this minimum analytical sample is unbalanced and selects on a primary outcome of interest (currently having a firm). To avoid this potential source of sample selection bias, we consider four alternative sample definitions, all of which are balanced in the sense that each unique individual appears in all periods, also implying some zero-valued outcomes are included. In order from smallest to largest, these are: (I) all unique individuals who are *both* a PEP and a firm-owner in the terminal period ($N=315$), equivalent to excluding row and column numbers (1); (II) all unique individuals who are a PEP in the terminal period ($N=825$); (III) all unique individuals who are a firm-owner in the terminal period ($N=109,547$); (IV) all unique individuals. We assess the empirical implications of these different sample choices below.

Econometric model

Moving to the mechanics of identification, consider the following general specification of the relation between a focus outcome (y) and PEP status:

$$y_{it} = \theta y_{i,t-1} + \alpha_i + \gamma_t + \beta_a \text{PEP}_{it} + \beta_b \text{ExPEP}_{it} + \varepsilon_{it} \quad (1.2)$$

where α_i and γ_t capture individual and period-specific effects respectively, with $i \in \mathcal{N} = \{1, \dots, N\}$ and $t \in \mathcal{T} = \{0, \dots, T\}$; PEP_{it} takes a value of one when individual i is classified as a current PEP; and ExPEP_{it} takes a value of one when classified as an ex-PEP. Modified definitions of the two treatment variables (e.g., using fractional values), as well as additional control variables can be incorporated straight-forwardly.

We choose to distinguish between current and former PEPs due to the complex ways in which business and politics can be interrelated. Private benefits associated with political office often go beyond immediate decision-making power over policy or procurement. They include making personal ties to important individuals (domestic and international) as well as access to privileged information (e.g., government investment plans), which represent forms of intangible (social) capital that do not necessarily dissolve on leaving office, perhaps exemplified by the common practice whereby ex-government ministers join as non-executive directors of large firms (see before; Greenberg et al. 2010). Splitting these different treatments thereby allows us to test whether changes in outcomes are equivalent across current and former PEPs. But, unlike conventional analyses of (staggered) monotonic treatments, this specification permits individuals to switch in and out of different treatment statuses over time.

With respect to other terms in the model, selection into political office may occur on factors that are also relevant for business success. To the extent these reflect fixed individual characteristics, such as entrepreneurial capabilities, skills, or inherited capital, this motivates inclusion of individual fixed-effects (α_i). On the other hand, particularly in environments where public and private influence intermix, business success may be a direct determinant of access to political office (e.g., Donald Trump), motivating inclusion

of prior outcomes in the specification.

Inclusion of this lagged term seems pertinent on other grounds. In particular, outcome growth rates may be a function of prior outcome levels. Non-linearity of this sort occurs in a wide range of macro- and micro-economic outcomes, including with respect to enterprise growth in developing countries (Van Biesebroeck 2005). Podobnik and Stanley (2008) show that size-dependency can account for the power law distributions of growth rates identified across many economic variables (also see Gabaix 2016). The same goes for the properties of networks, where characteristics such as the evolution of the node degree distribution are understood to depend on the existing degree distribution (Krapivsky and Redner 2003) – i.e., these processes exhibit state dependence. Similarly, models of changes in status or position (strength) in a network tend to give a fundamental role to lagged outcomes. For instance, models of progress in scientific careers and citations of scholarly publications show clear path-dependency and, in turn, exponential growth over time (DiPrete and Eirich 2006; Newman 2003).

A caveat with respect to equation (1.2) concerns the focus on the *level* of the outcome on the LHS. Due to the way in which the data was constructed, the temporal series of business metrics, such as the number of companies an individual owns, are largely differentiated only by the horizon applied to the firm register (see Section 1.4) – i.e., observations in time T include all companies created from $t = 0$ to $t = T$. As such, outcomes at the individual-level are expected to be highly autocorrelated (near unit-root processes). For instance, the number of companies in which an individual is an owner follows a process similar to: $Y_t = Y_{t-1} + N_t$, where N_t is the number of companies established during the 5-year period indexed by t (between the end of the previous period and the end of the current period). To address some difficulties associated with analysis of these kinds of processes in short panels we apply the following modification:

$$\dot{y}_{it} = (\theta - 1)y_{i,t-1} + \alpha_i + \gamma_t + \beta_a \text{PEP}_{it} + \beta_b \text{ExPEP}_{it} + \varepsilon_{it} \quad (1.3)$$

where $\dot{y}_{it} = y_{it} - y_{it-1}$. And while this, specification is mechanically identical to that of equation (1.2), it provides an appropriate *basis* for estimation under alternative assump-

tions regarding the stationarity of the outcome(s).

It is tempting to estimate equation (1.3) using a conventional two-way fixed-effects estimator. However, given the short time dimension of the panel structure available, Nickell-bias is likely to be severe. A range of solutions to this problem have been proposed, such as GMM estimation; but, as Kiviet et al. (2017) show, these tend to be highly sensitive to a variety of implementation choices. Consequently, we are faced with two primary options: either (i) impose the assumption of an exact unit root ($\theta \equiv 1$) and proceed with a high-dimension two-way fixed-effects (FE) estimator; or (ii) exclude the individual fixed-effects, as per a standard lagged outcome (LO) model augmented with time invariant controls, estimated by OLS.

Ex ante, we do not take a position on which of these two specifications (and associated estimators) is preferred. While exclusion of individual effects may seem problematic, these unobserved terms are plausibly absorbed by the prior outcome, making it an attractive strategy.¹⁹ Thus, throughout our main analysis we report results from both specifications. In addition to providing insights on robustness, an advantage of this dual approach is that – under reasonable conditions that plausibly apply here – the FE and LO specifications are expected to bracket the true parameter estimate of interest. As we elaborate in Appendix 1.C, in line with Guryan (2001), if there is positive selection into the treatment based on *either* unobserved unit-specific characteristics *or* on lagged outcomes, then we can expect: $\hat{\beta}_{\text{FE}} \leq \beta \leq \hat{\beta}_{\text{LO}}$, where subscripts refer to the specification applied.

Aside from the choice of estimator, extensions to equation (1.3) can be contemplated. One is to take into account the length of time an individual has held office – recall from Figure 1.1, while around half of all PEPs are active under 10 years, a small share (about 10%) are active for over twenty years spanning multiple mandates, often spanning both executive and party political office. To account for the possible relevance of accumulating

¹⁹ As Imbens and Wooldridge (2009) clarify: “... the DiD [difference-in-differences] approach appears less attractive than the [lagged outcome] unconfoundedness-based approach in the context of panel data. It is difficult to see how making treated and control units comparable on lagged outcomes will make the causal interpretation of their difference less credible, as suggested by the DiD assumptions”.

or consolidating power, we consider the following dynamic (event study) specification:

$$\dot{y}_{it} = (\theta - 1)y_{i,t-1} + \alpha_i + \gamma_t + \sum_{p=-a}^b \delta_p [t - t_i^* \equiv p] \cdot \text{PEP}_i + \beta_b \text{ExPEP}_{it} + \varepsilon_{it} \quad (1.4)$$

where t^* records the first period in which an individual becomes a PEP; PEP_i takes a value of one if an individual is ever a PEP; and the term in brackets evaluates to zero or one. Thus, the series of estimates $\delta_{-a}, \dots, \delta_0, \dots, \delta_b$ captures differences in outcomes for consecutive periods either before or after an individual becomes a PEP, with δ_0 being the first period in which an individual is a PEP. Additional details associated with estimation of this dynamic model are discussed in the presentation of the results.

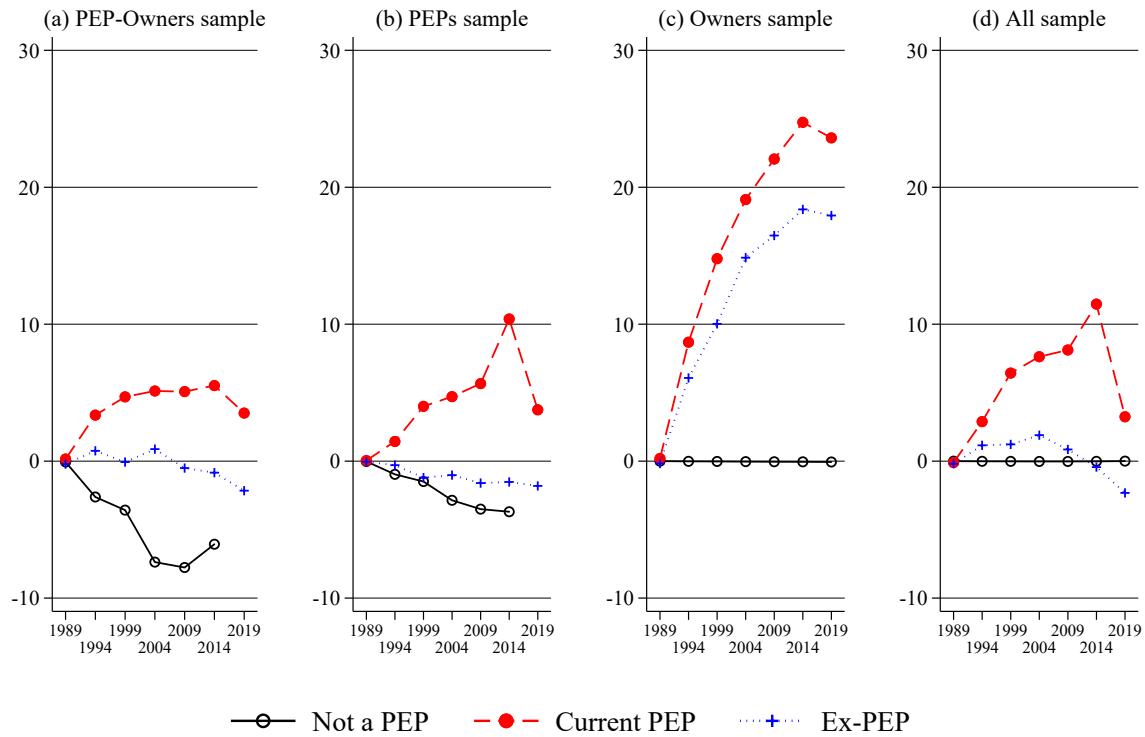
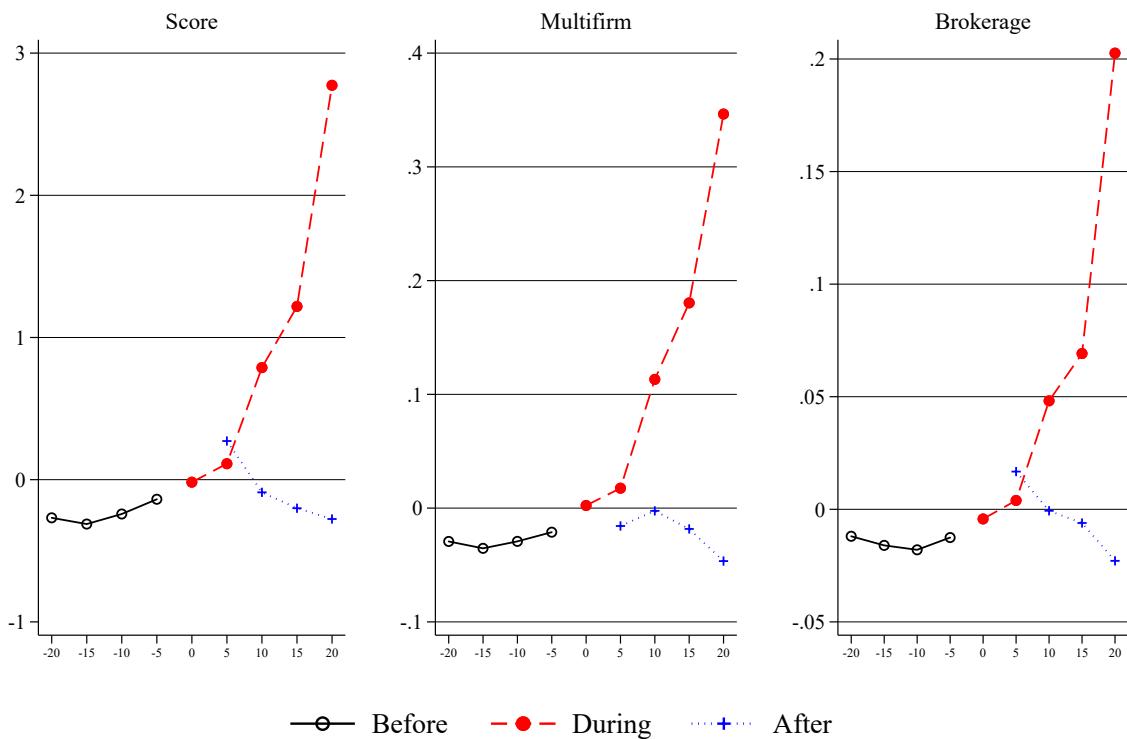
1.6 Results

Descriptive evidence

For preliminary insights into the extent to which holding public office may be associated with differential private business success, as well as the significance of alternative sample restrictions, we start by examining graphical evidence. Figure 1.3 panel (i) plots period averages for the synthetic outcome in levels, distinguishing between non-PEPs, current PEPs and ex-PEPs (for other outcomes see Appendix Figure 1.B.6). These groups are mutually exclusive – the first includes at least some individuals who later become PEPs, while the latter includes those who presently no longer hold office. We run the analysis using the four samples of interest; and, for each of these we center the outcome on the period-specific mean, equivalent to adjusting for time fixed-effects.²⁰ Unadjusted outcomes for both the full sample and PEPs sub-sample are reported in Table 1.A.1 for reference.

Regardless of the chosen sample, we observe material differences between PEP status groups for the majority of outcomes, including the synthetic measure. In particular,

²⁰ In the samples including all firm owners (sub-figures c and d), the vast majority of observations pertain to the non-PEP category. Thus, the average for this group is almost identical to the overall mean, implying the time-adjusted value is always approximately zero.

Figure 1.3: Comparison of outcomes over time across PEP categories(i) *Synthetic outcome, alternative samples, calendar periods:*(ii) *Multiple outcomes, PEP sample, before, during and after holding public office*

Source: authors' estimates from merged panel data.

Note: figures plot period averages for specified outcomes for different groups – current PEPs, ex-PEPs and not PEPs; panel (i) covers alternative samples with the synthetic outcome; panel (b) covers alternative outcomes with the PEPs sample; all outcomes are centered on the chosen full sample period means; panel (i) is ordered chronologically; panel (ii) is ordered by time before/after becoming a PEP.

current PEPs are consistently associated with the highest outcomes and non-PEPs the lowest. For example, current PEPs on average own around 0.7 more firms and broker at least 5 percent more relationships between their direct contacts than non-PEPs. These gaps are not so evident in the early periods, when there are both few active PEPs and few firms and generally expand over time, despite a small reversion in the final period. Results for ex-PEPs virtually always fall between those of the two other groups, suggesting that current office holders are generally most active in developing their business network and possibly best able to leverage their position to private advantage.

Results from the different samples tell a consistent story, but are not identical. In particular, the owners sample (sub-figure c) tends to indicate larger differences between PEPs and non-PEPs. This is driven by two factors. First is inclusion of the substantial number of business owners who never become PEPs, many of whom are small-scale entrepreneurs unconnected to any wider business networks. Second is exclusion of PEPs who never own a business, whose outcomes are valued at zero and therefore pull-down the current and ex-PEP group means. Comparison against results for the full sample demonstrates the influence of these zero-valued outcomes. Put differently, both the PEPs and full sample (sub-figures b and d) suggest the most conservative estimates of the contrasts of interest. But, given PEPs may share some common unobserved latent trait that is beneficial for business success, we choose the former as our focus sample, while continuing to consider the others for robustness purposes.

Taking a dynamic view, similar in spirit to an event study analysis (see above, equation 1.4), panel (ii) of Figure 1.3 plots period-demeaned outcome averages for the PEP sample, distinguishing between the number of years before or after first becoming a PEP – i.e., period zero is the first period in which they become a PEP; and ‘after’ is the average outcome among individuals who have held office but no longer do so, which is only feasible from period 5 onwards. These results broadly confirm the previous graphical evidence – outcomes for current PEPs are consistently higher than in the ‘before’ or ‘after’ cases. Additionally, they indicate that gains from holding office may compound over time, suggestive of an important role of consolidated political power, perhaps linked to party

grandees. We return to this point in Section 1.6.

Average effects

Moving to the regression analysis, Table 1.5 summarizes regression results for the synthetic outcome based on equation (1.3), sequentially building-up to the full lagged outcome (LO) and fixed-effects (FE) specifications. Column (I) regresses the outcome on the two treatment variables only, as well as period fixed-effects. Column (II) adds a small set of controls, including the lagged number of alterations, closures and other legal entities registered to the individual. For ease of interpretation and due to substantive positive skews in the data, unless otherwise stated, unbounded continuous variables are IHS-transformed.²¹ We also include time invariant controls, including the individual's estimated gender, whether the individual appears in the register of lawyers, and variables capturing their activity before 1985 (e.g., whether they were a PEP or held a firm in this period).²²

Columns (III) and (IV) add two more specific controls, namely the initial level of the outcome (observed in 1985) and then the lagged level, respectively. Thus, estimates in column (IV) almost directly conform to the specification in equation (1.3) without individual fixed-effects but with controls. To compensate for the absence of the latter, columns (V) and (VI) add controls for the person type and firm establishment year cohort. The former is defined according to the source database(s) in which each individual is ever observed up to 2019 (PEP list, firm register or both); and the latter defines cohorts of firm-owners by the first year in which they enter the BdR3 register. Column (VI) thus gives the complete LO specification. The full FE specification in column (VII) is identical, except the coefficient on the lagged outcome is set to zero and unit fixed-effects are included, thereby eliminating other time invariant terms. All specifications are estimated using

²¹ The inverse hyperbolic sine (IHS) transform is appropriate to deal with zero values (Bellemare and Wichman 2020) and removes differences in scale, allowing more meaningful comparison of results and compressing the variance of the transformed series (in levels and differences). Variables of this form entering the principal components analysis are IHS transformed as well.

²² Gender is not recorded in the raw data but is estimated from individual first names as a probability. The register of lawyers is taken from the list of registered *advogados* available at <https://oam.org.mz/advogados-inscritos/>.

Table 1.5: Regression estimates for synthetic business network capital, PEP sample

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
(a) <i>Binary treatments:</i>							
Current PEP	1.99*** (0.35)	1.51*** (0.34)	1.50*** (0.34)	1.44*** (0.34)	1.41*** (0.31)	1.12*** (0.28)	0.90** (0.38)
Ex-PEP	-0.52* (0.29)	-0.88*** (0.31)	-0.90*** (0.31)	-0.94*** (0.30)	-0.20 (0.27)	-0.57** (0.26)	-0.29 (0.50)
Female		-0.92*** (0.23)	-0.91*** (0.23)	-0.85*** (0.22)	-0.22 (0.20)	-0.08 (0.19)	
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	7.08	6.99	6.99	6.98	6.54	6.35	6.35
(b) <i>Fractional treatments:</i>							
Current PEP	3.37*** (0.48)	2.74*** (0.48)	2.73*** (0.48)	2.64*** (0.47)	2.10*** (0.44)	1.76*** (0.41)	1.34*** (0.49)
Ex-PEP	-0.27 (0.28)	-0.65** (0.29)	-0.66** (0.29)	-0.70** (0.28)	-0.02 (0.25)	-0.35 (0.24)	0.17 (0.50)
Female		-0.87*** (0.22)	-0.86*** (0.23)	-0.81*** (0.22)	-0.19 (0.20)	-0.05 (0.19)	
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	7.06	6.98	6.97	6.97	6.54	6.35	6.35
Period effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	Yes	Yes	Yes	Yes	Yes
Initial outcome	No	No	Yes	Yes	Yes	Yes	No
Lagged outcome	No	No	No	Yes	Yes	Yes	No
Person-type effects	No	No	No	No	Yes	Yes	Yes
Firm cohort effects	No	No	No	No	No	Yes	Yes
Individual effects	No	No	No	No	No	No	Yes

significance: *p < 0.10, **p < 0.05, ***p < 0.01.

Source: authors' estimates from merged panel data.

Note: table reports selected coefficients for the first difference of IHS-transform of the Godfather centrality metric per person across 5-year periods for the PEP sample; panels (a) and (b) define treatments in binary and continuous (share) terms respectively; footer indicates specification model; columns (IV)-(VI) represent a lagged outcome model specification; column (VII) contains individual fixed-effects; period fixed-effects included throughout; standard errors (in parentheses) clustered by unique individual.

ordinary least squares and standard errors are clustered at the individual level.²³

The two treatment variables – being a current PEP and being an ex-PEP – are operationalized as binary variables in panel (a) of the table. So, if an individual held public office at any point during a given 5 year period they are deemed to be a current PEP for that period; and in all subsequent periods in which they hold no office they are classified as an ex-PEP. In panel (b) the treatment variables are defined as the fraction of the period in which the individual takes a particular role. In all cases, the sum of these two treatments is less than or equal to one.

Appendix Tables 1.A.3 and 1.A.4 replicate the previous analysis for two more specific outcomes, the number of companies and godfather centrality (both IHS-transformed). Table 1.6(a) summarises estimates based on the complete LO and FE specifications across all distinct outcomes, using the fractional treatment definition. For reference, the footer of this panel reports counterfactual values against which the estimated treatment effect magnitudes can be evaluated. For the LO estimates this is the average *level* of the outcome among all so-called non-current PEPs in the sample, which is chosen since the coefficient estimates in the LO model are mechanically identical to those obtained from an autoregressive specification in levels (see equation 1.2). For the FE estimates, the counterfactual is the average *first difference* of the outcome among the same non-PEPs. A visual overview of the coefficient estimates from this panel is given in Figure 1.4(i).

What do we learn? First, there is a consistent and statistically significant positive association between holding public office and business outcomes. Second, this effect pertains primarily to current office holders. While in the basic specifications (columns I to V) we generally observe a significant *negative* effect associated with being an ex-PEP, in the complete specifications these coefficients are generally not different from zero at conventional significance levels (5% or below). Third, as we move left to right in the table, the magnitudes of the coefficient estimates for both current and past office holders generally shrink toward zero – e.g., from 1.97 in column I of Table 1.5(a) to 1.08 in column VI. And, in line with the hypothesized bracketing property of the LO and FE specifications, the

²³ Throughout, we use the high-dimensional fixed-effects estimator `reghdfe` in Stata.

Table 1.6: Summary of main regression results with alternative treatment definitions and analytical levels, PEPs sample, fractional treatments

	(I) Companies		(II) Degree		(III) Closeness		(IV) Brokerage		(V) Godfather		(VI) Decay	
	LO	FE	LO	FE	LO	FE	LO	FE	LO	FE	LO	FE
(a) Individual-level analysis												
Current PEP	0.08*** (0.02)	0.06*** (0.02)	0.12*** (0.03)	0.07* (0.04)	0.02*** (0.01)	0.02** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.19*** (0.05)	0.11** (0.06)	0.14*** (0.04)	0.06 (0.06)
Ex-PEP	-0.01 (0.01)	0.02 (0.02)	0.00 (0.02)	0.01 (0.04)	0.00 (0.00)	0.00 (0.01)	-0.01 (0.00)	0.01 (0.01)	-0.06** (0.03)	-0.03 (0.06)	0.01 (0.03)	0.01 (0.06)
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.28	0.29	0.52	0.56	0.12	0.14	0.09	0.09	0.73	0.73	0.73	0.77
Control mean	0.16	0.10	0.25	0.16	0.05	0.03	0.02	0.02	0.16	0.12	0.32	0.22
(b) Individual-level analysis												
Current party PEP	0.14*** (0.02)	0.13*** (0.03)	0.19*** (0.04)	0.16*** (0.06)	0.02* (0.01)	0.02* (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.32*** (0.06)	0.25*** (0.09)	0.27*** (0.06)	0.23*** (0.08)
Current exec. PEP	0.03 (0.02)	0.03 (0.03)	0.05 (0.04)	0.03 (0.05)	0.02* (0.01)	0.02* (0.01)	0.02** (0.01)	0.02 (0.01)	0.13** (0.06)	0.09 (0.07)	0.02 (0.05)	-0.02 (0.07)
Ex-party PEP	-0.01 (0.01)	0.02 (0.03)	-0.01 (0.02)	0.01 (0.05)	-0.00 (0.00)	0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)	-0.03 (0.03)	0.01 (0.07)	-0.00 (0.03)	0.03 (0.07)
Ex-exec. PEP	0.07*** (0.02)	0.11*** (0.03)	0.08** (0.04)	0.14** (0.06)	-0.00 (0.01)	0.00 (0.01)	0.02** (0.01)	0.03** (0.01)	0.11** (0.05)	0.19** (0.09)	0.15*** (0.05)	0.22** (0.09)
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.28	0.29	0.52	0.56	0.12	0.14	0.09	0.09	0.73	0.73	0.73	0.77
(c) Family-level analysis												
Current party PEP	0.20*** (0.04)	0.15*** (0.05)	0.27*** (0.06)	0.20** (0.09)	-0.00 (0.01)	-0.00 (0.01)	0.04*** (0.01)	0.05** (0.02)	0.50*** (0.10)	0.42** (0.17)	0.22* (0.12)	0.26 (0.20)
Current exec. PEP	0.20*** (0.04)	0.10** (0.05)	0.21*** (0.06)	0.03 (0.08)	0.02*** (0.01)	0.00 (0.01)	0.05*** (0.01)	0.04* (0.02)	0.32*** (0.10)	0.19 (0.17)	0.36*** (0.12)	-0.02 (0.20)
Ex-party PEP	0.03 (0.03)	0.01 (0.06)	-0.01 (0.04)	-0.06 (0.09)	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	0.00 (0.02)	-0.07 (0.06)	-0.11 (0.17)	-0.02 (0.08)	-0.02 (0.21)
Ex-exec. PEP	0.12*** (0.03)	0.00 (0.05)	0.09** (0.04)	-0.12 (0.09)	0.01 (0.00)	-0.00 (0.01)	-0.00 (0.01)	-0.03 (0.02)	0.06 (0.06)	-0.18 (0.18)	0.01 (0.07)	-0.31 (0.19)
Obs.	161,814	161,814	161,814	161,814	161,814	161,814	161,814	161,814	161,814	161,814	161,814	161,814
RMSE	0.36	0.40	0.62	0.66	0.13	0.14	0.10	0.10	0.64	0.67	1.82	1.93

significance: *p < 0.10, **p < 0.05, ***p < 0.01.

Source: authors' estimates from merged panel data.

Notes: the table summarises estimates from the full LO (lagged outcome) and FE (fixed effects) specifications for a range of outcomes (given in the columns); control variables not shown; see Table 1.5 for reference specifications; panels (a) and (b) are run at the individual-level; panel (c) is based on the alternative panel constructed at the family-name level; standard errors are clustered at the chosen level of aggregation; panels (b) and (c) disaggregate the treatments to distinguish between party and executive PEPs; 'control means' (counterfactuals) are averages of the outcome among non-PEPs – for the LO specification this refers to the outcome level and for the FE specification the first difference; fractional PEP treatments applied throughout.

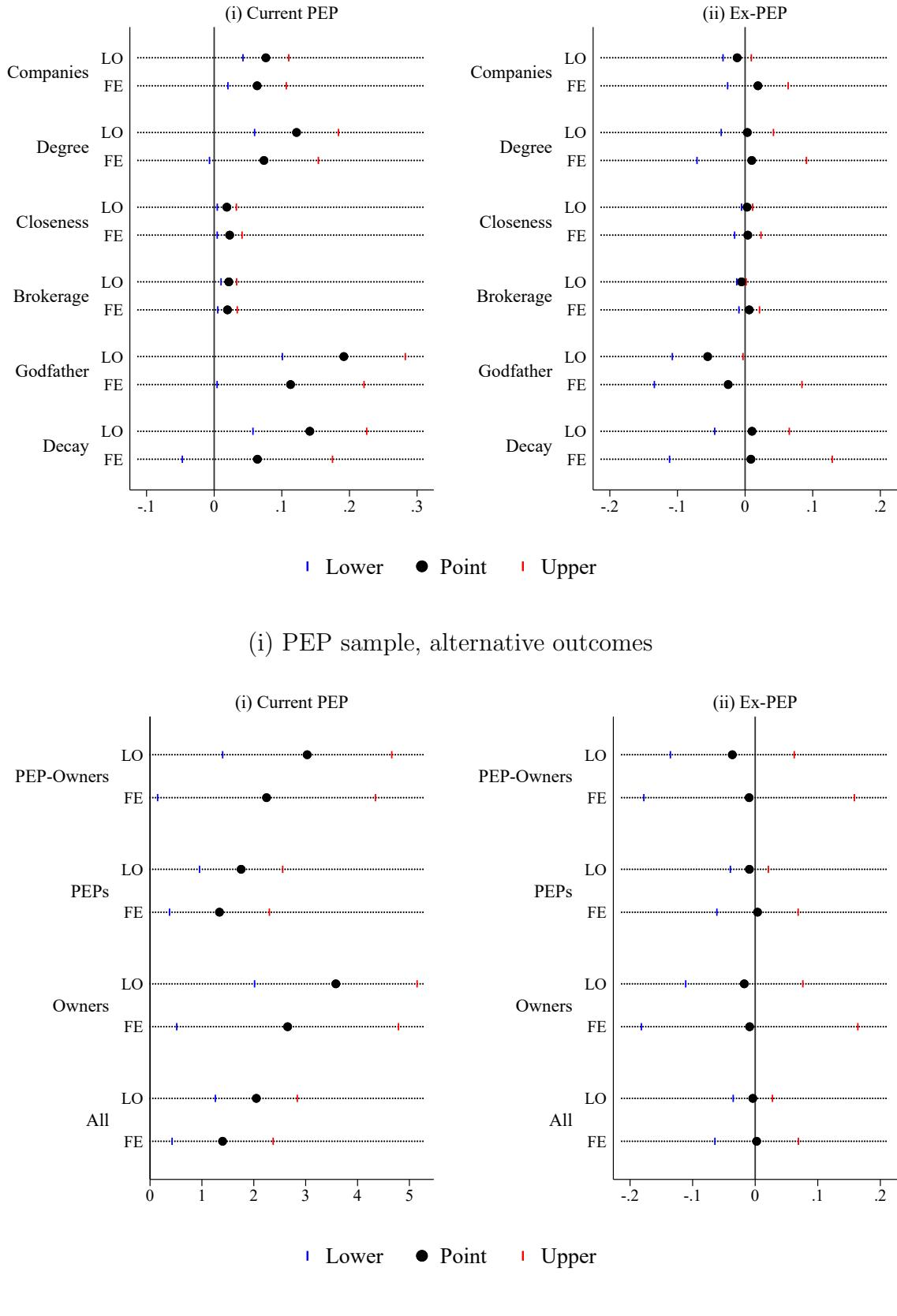


Figure 1.4: Note: The upper panel (i) summarizes results from Table 1.6(a); panel (ii) summarizes results based on different samples, using the synthetic outcome measure only; LO and FE refer to alternative specifications; each plot refers to a separate regression; 'lower' and 'upper' are the 95% confidence intervals; PEP treatments are fractional.

former estimates for being a current PEP are typically larger than those of the latter, but with a small absolute difference under the complete LO specification. Last, coefficient estimates using the fractional treatments (e.g., Table 1.5, panel b) are almost always larger in magnitude than those obtained using the binary approximation, plausibly driven by greater measurement error in the latter case.

These results support our preliminary conclusion from the descriptive analysis – there are consistent positive effects on business outcomes associated with being a current PEP, but there are no clear effects associated with ex-PEPs. The magnitudes of the former effects are also material. For instance, the estimates in column (I) of Table 1.6(a) show the number of companies in which an individual owns a stake increases by approximately an additional 7 log points (0.07) when they hold political office, implying a growth rate over 1.5 times the counterfactual. Similarly, current PEPs see their godfather centrality increase by about double the counterfactual rate; while the share of ties PEPs broker increases by around 2 log points during periods they hold office, against a counterfactual level of the same magnitude. In short, PEPs secure large strategic positional gains within the business-owner network while they hold office but this does not persist when out of office.

Figure 1.4 (i) returns to the synthetic outcome, summarizing results across different samples. Appendix Tables 1.A.5 and 1.A.6 provide a complementary summary for the current PEP and ex-PEP ‘treatments’, encompassing estimates from all four alternative sample definitions for both the LO and FE specifications as well as implementing the Benjamini-Hochberg adjustment for multiple hypothesis testing, reported in the probability value in (square) brackets. Note that in running estimates for the owner and full samples, observations encompass *both* individuals who are or later become PEPs and individuals who are *only* ever observed as firm-owners. To account for any (time-varying) unobserved differences associated with these distinctive groups, estimates for these samples include separate period fixed-effects for individuals who only ever appear in the firm registry and all others (ever PEPs). The main messages from these estimates are unchanged and remain broadly robust across different samples. For instance, using the full

sample and fractional treatment definition, 10 of the 12 coefficient estimates associated with being a current PEP are positive and significant at the 5% level after correcting for the false discovery rate (and all but one are significant at the 10% level); but none of the estimates associated with being an ex-PEP are statistically significant. Coefficient magnitudes are also largely consistent across sub-sample estimates but generally higher when we focus exclusively on firm owners, reflecting the smaller share of zero values among PEPs when non-owners are excluded.

Dynamic effects

In the context of longitudinal data, investigation of *how* treatment effects vary with time to exposure is often valuable. As Goodman-Bacon (2018a,b) and others have shown, event study analyses can help examine the plausibility of the implicit assumption that control and treatment groups shared similar pre-treatment trajectories. They can also demonstrate the extent to which treatment effects are stable over time after exposure. To look at this, we re-run the complete LO and FE specifications with the preferred PEP sample, modifying the model as per equation (1.4). A key difference here is that we focus on the first period an individual becomes a PEP *during* the sample period and estimate separate coefficients for each period before and after that event regardless of whether they continue to remain a PEP. However, we also include in the model the second treatment variable, which takes a value of one if the individual is no longer a PEP. Thus, $t = 0$ refers to the period in which individuals first become a PEP, $t = 1$ is the following period (5 years afterwards), and so on. As in other studies, we normalize the set of these period-specific treatment dummies such that the effect at $t = -2$ equals zero; and the small number of coefficients relating to periods before $t = -4$ and after $t = 4$ are aggregated into these limit points.

Figure 1.5 plots results for the synthetic business network capital based on the LO and FE specifications (panels a and b respectively); Appendix Figures 1.B.7 and 1.B.8 replicate the same analysis for each main constituent outcome. The bars in the event plots are derived from alternative estimators, recommended to address problems associated with

negative weighting and inadmissible controls that can arise in staggered treatment designs with heterogeneous effects (Baker et al. 2022). Concretely, to cover a variety of empirical methods found in the literature, we use the flexible estimators proposed by Cengiz et al. (2019) (denoted CDBZ2019), Sun and Abraham (2021) (denoted SA2021), and Gardner (2021) (denoted BG2021) respectively.²⁴

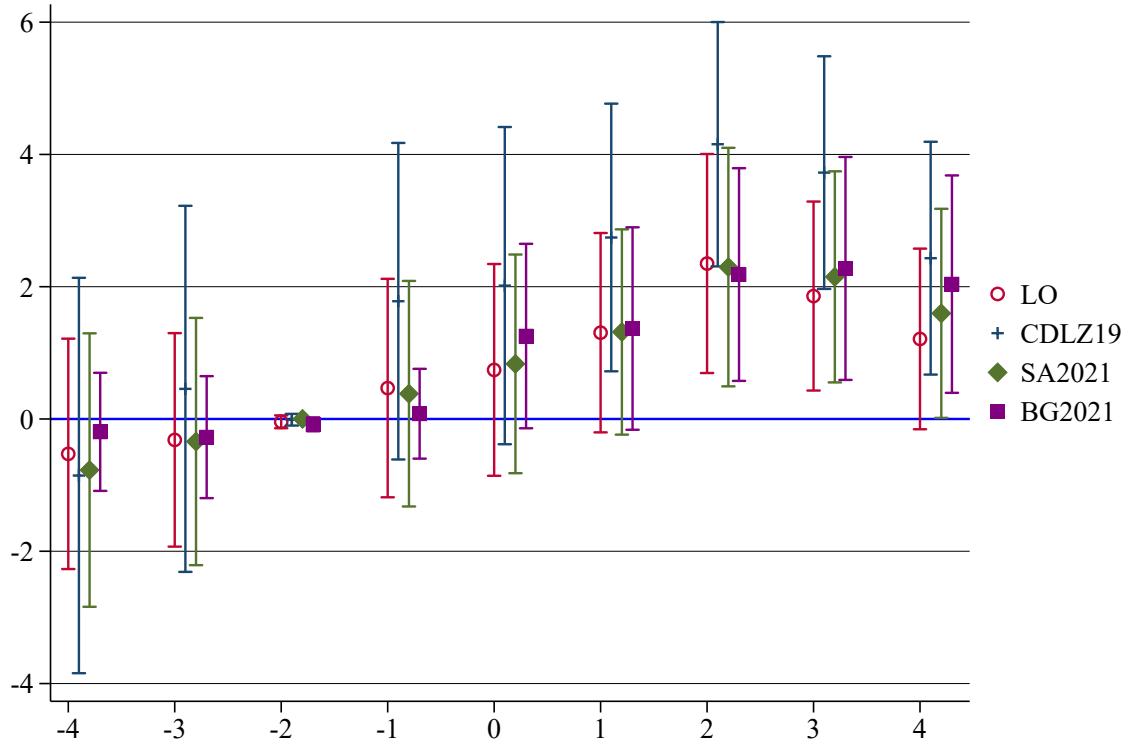
Although no single pattern is evident across all plots, the pre-treatment coefficient estimates associated with the periods before becoming a PEP ($t < 0$) are consistently not different from zero; and estimates immediately prior to becoming a PEP are generally very close to zero. We also observe that the specific treatment effect at $t = 0$ is small in magnitude, with confidence intervals that span zero, indicating gains from holding office are not evident in the firm registry (owner network) straight-away. However, across most outcomes we note a gradual increase in the post-treatment dynamic effects, peaking at $t = 2$ or around 10 years after becoming a PEP. This is particularly evident for the number of companies owned, brokerage and godfather centrality, where these later treatment effects clearly move into the positive and significant domain based on the LO specification. In this latter case, results from the four different estimators align closely, suggesting no substantive bias from our previous LO estimation procedure. Results from the FE specification, however, are generally less precise and sensitive to the method chosen. This may be driven by the predominance of zero values in the outcomes, as well as the short panel available at the individual level.²⁵

Robustness

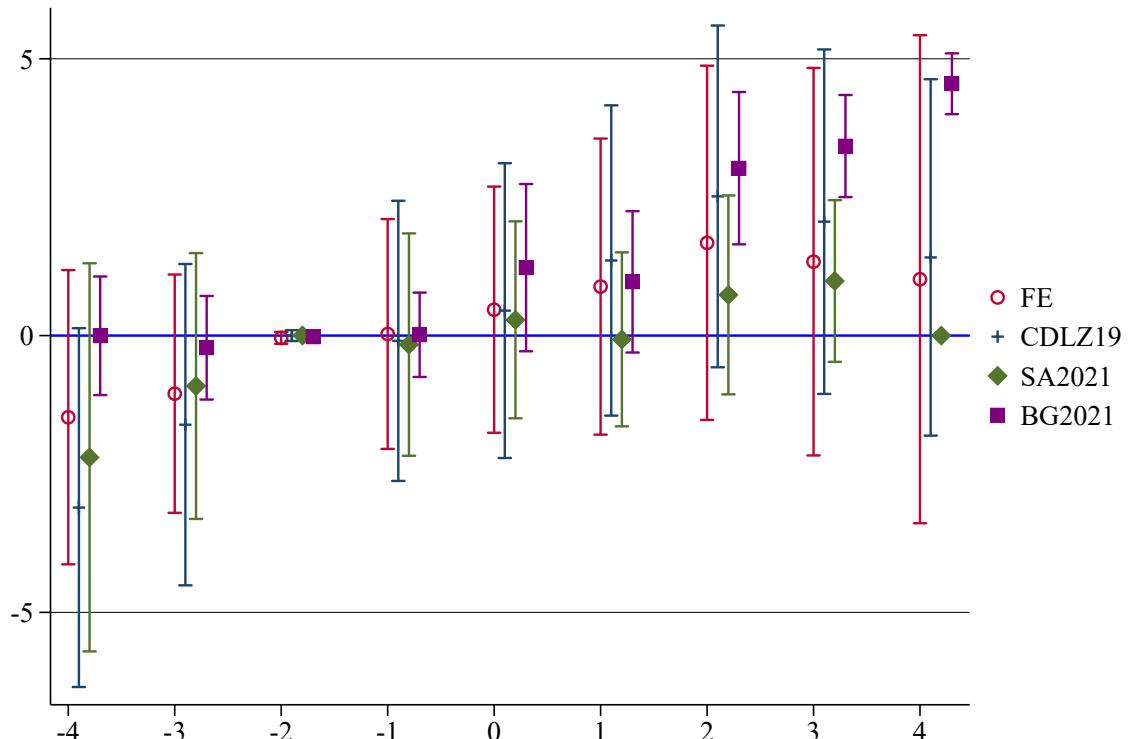
We now review the robustness of our average treatment effect results, investigating five main dimensions. First, we run a placebo analysis on the PEP sample. For each individual PEP, we match their office-holding history (current and ex-PEP series) and control variables to the time series of business outcomes of a different randomly-chosen PEP,

²⁴ These approaches respectively cover stacking, re-weighting and imputation-based methods, implemented in Stata using the packages `stackedev`, `eventstudyinteract` and `did2s`. See https://asjadnaqvi.github.io/DiD/docs/01_stata/ for further references.

²⁵ Recall, 62% of PEPs never own a company, so individual fixed-effects ‘perfectly’ predict the series of outcomes for these individuals.



(a) Lagged outcome specification



(b) Fixed-effects specification

Figure 1.5: Event study analysis for becoming a PEP on synthetic business network capital Note: each panel plots the event study coefficients and 95% confidence intervals for being a PEP for different outcomes, using the full LO and FE specifications for the PEP sample; $t = 0$ denotes the period in which individuals first become a PEP; the set of dummy variables is normalized to equal zero at $t = -2$; alternative estimators are shown in the figure legend.

thereby splitting the relationship between outcomes and the explanatory variables while maintaining the original panel structure of the data (i.e., all variables remain in their original time order). We run 200 permutations of this random matching algorithm, in each iteration estimating the full LO and FE models from Table 1.5(b) and saving the estimated results for the current PEP treatment.

Appendix Figure illustrates the results for synthetic business network capital; and Figure 1.B.10 illustrates for the main underlying outcomes. For each specification and outcome, the plots show the distribution of estimated t-statistics, where the solid vertical line (in red) indicates the t-statistic obtained from the observed data, from which we calculate the permutation-based probability that these observed results were obtained by chance alone. As can be seen, the LO results are highly robust to this procedure – less than 1% of the random permutations yield a t-statistic larger than estimated from the observed data. The FE results are also robust, but marginally weaker. For three outcomes, namely the brokerage rate and godfather centrality, we obtain a t-statistic at least as large as that estimated from observed data around 5% of the time (or less). However, for decay centrality, the probability of obtaining a t-statistic of similar magnitude rises to around 10%. Importantly, these permutation-based probability estimates are highly consistent with those estimated from our earlier regressions. Thus, this analysis adds clear support to the previous findings.

Second, similar in spirit to effect decompositions across different treatment timing groups (e.g., Goodman-Bacon 2018a), we consider whether our results rely on observations from specific PEP cohorts, defined as the five year period when an individual first became a PEP. Continuing with synthetic business network capital, panel (a) of Table 1.7 re-runs the full LO specification for the PEP sample, now excluding each cohort in different analyses (as indicated in the panel footer). Similarly, we classify PEPs by the length of time they have been active, defined from the time span between their first and last years holding office, placing them into groups. As reported in panel (b) of the same table, we re-run our preferred model excluding each of these groups in turn. Both exercises given no indication our results are sensitive to dropping different treatment cohorts (see also

Table 1.A.7 for the corresponding FE results).

Third, we remove potentially contaminated or influential units. Concretely, in panel (c) of Table 1.7 we drop all units in all periods in which we observe: any firm alterations (column I); any firm closures (column II); and in columns (III)-(VIII) values above the 95th percentile of the firm-owner distributions of the number of companies owned, the individual's degree, their closeness, their godfather centrality, their decay centrality and their synthetic business network capital. While these exclusions do provoke some changes in the point estimates, they remain positive and significant throughout.

Fourth, we investigate alternative assumptions for the autoregressive parameter θ in equation (1.2), which is fixed at unity in the FE specification but left free in the LO specification. Concretely, we start by estimating the full LO specification in levels and save the estimate $\hat{\theta}$. Next, we re-run both the earlier LO and FE models but without the lagged dependent variable, redefining the dependent variable as: $y_t - (\hat{\theta} + e)y_{t-1}$ and selecting successive values for e in the range (-.25,.25). So, for $e \approx 0$, this will approximate the treatment of the dependent variable in the full LO model; and $\hat{\theta} + e \approx 1$ approximates the treatment of the dependent variable under the FE model (but here without the fixed effects). Our main estimates remain robust to these alternative assumptions.

Last, we consider spillover effects. A recurrent theme of scholarship around cronyism is that private benefits are often distributed across wider family groups or dynasties. Where this is the case, we could expect to find spillovers from holding public office beyond each individual PEP to family members, violating the stable unit treatment value assumption. In the absence of detailed information on actual family ties, we presume individuals with the same family name belong to the same family group. We then perform a series of analyses under the assumption that, for each PEP, some pre-specified share (ρ) of their family members all receive the same treatment – i.e., we copy the values of the current and ex-PEP treatment variables to these randomly selected family members. Panel (e) of the Table 1.7 reports these results for the synthetic outcome, applying the LO specification and selecting values for ρ between zero and one (as stated in the footer).²⁶ Moving from

²⁶ This analysis relies on the sample of families containing PEPs, but removes one person families and families with more than 200 members.

Table 1.7: Robustness analysis for synthetic business network capital, PEP sample, LO specification

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
(a) Exclude PEP year cohorts:								
Current PEP	1.28*** (0.42)	1.64*** (0.44)	1.75*** (0.45)	1.99*** (0.43)	2.17*** (0.46)	1.79*** (0.44)	1.67*** (0.42)	1.82*** (0.50)
Ex-PEP	-0.32 (0.24)	-0.44 (0.33)	-0.25 (0.25)	-0.41* (0.23)	-0.38 (0.25)	-0.36 (0.24)	-0.35 (0.24)	-0.23 (0.34)
Obs.	3,960	4,104	4,392	4,788	4,128	4,746	4,686	4,056
Cohort year	1980	1985	1990	1995	2000	2005	2010	2015
(b) Exclude PEP time span cohorts:								
Current PEP	1.68*** (0.41)	1.65*** (0.46)	1.99*** (0.43)	2.08*** (0.47)	1.67*** (0.43)	1.47*** (0.43)	1.86*** (0.45)	1.50*** (0.45)
Ex-PEP	-0.47 (0.30)	-0.38 (0.31)	-0.30 (0.25)	-0.45* (0.25)	-0.26 (0.26)	-0.27 (0.25)	-0.40* (0.24)	-0.20 (0.23)
Obs.	4,404	4,248	4,476	4,302	4,188	4,302	4,464	4,476
Cohort max. span	3	4	5	6	8	14	20	53
(c) Exclude influential units:								
Current PEP	0.89*** (0.27)	1.68*** (0.40)	1.72*** (0.39)	1.49*** (0.39)	1.76*** (0.41)	1.39*** (0.39)	1.00*** (0.38)	1.44*** (0.39)
Ex-PEP	-0.12 (0.13)	-0.29 (0.23)	-0.11 (0.22)	-0.16 (0.22)	-0.35 (0.24)	-0.18 (0.22)	-0.25 (0.21)	-0.16 (0.21)
Obs.	3,918	4,890	4,830	4,842	4,980	4,836	4,758	4,800
(d) Fix autoregressive parameter:								
Current PEP	1.88*** (0.43)	1.85*** (0.42)	1.81*** (0.41)	1.77*** (0.41)	1.74*** (0.41)	1.70*** (0.41)	1.66*** (0.41)	1.63*** (0.42)
Ex-PEP	-0.11 (0.28)	-0.18 (0.27)	-0.24 (0.25)	-0.31 (0.24)	-0.38 (0.23)	-0.45** (0.23)	-0.52** (0.22)	-0.59*** (0.22)
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980
$\theta + e$	0.60	0.67	0.75	0.82	0.89	0.96	1.03	1.10
e	-0.25	-0.18	-0.11	-0.04	0.04	0.11	0.18	0.25
(e) Family spillovers:								
Current PEP	2.45*** (0.48)	0.94*** (0.20)	0.53*** (0.15)	0.42*** (0.12)	0.38*** (0.10)	0.39*** (0.09)	0.41*** (0.08)	0.41*** (0.08)
Ex-PEP	0.03 (0.33)	0.28** (0.14)	0.13 (0.11)	0.08 (0.09)	0.07 (0.08)	0.07 (0.07)	0.04 (0.06)	0.04 (0.06)
Obs.	86,412	86,412	86,412	86,412	86,412	86,412	86,412	86,412
ρ	0.00	0.14	0.29	0.43	0.57	0.71	0.86	1.00

significance: *p \leq 0.10, **p \leq 0.05, ***p \leq 0.01.

Source: authors' estimates from merged panel data.

Notes: table shows estimates for the LO specification, using the PEP sample, based on the synthetic outcome; all estimates at the individual-level; panel (a) excludes specified PEP cohorts; panel (b) excludes PEPs classified by time spent as PEP; panel (c) excludes influential units (see text); panel (d) fixes the autoregressive parameter at values $\theta + e$; panel (e) assumes a random share ρ of family members are also 'treated'.

left to right in the table, coefficient estimates consistently decline as ρ increases. Even so, all estimates for current PEPs remain positive and statistically significant, and this holds even if we exclude the original PEPs from the same regressions (not shown). This motivates further analysis of familial-spillovers, which we pursue below.

Extensions

Complementary to testing for robustness, we extend the analysis in three main directions. First, up to now we have considered party and executive political offices in conjunction. However, the private benefits of holding these offices are not necessarily identical. Even in an ‘institutionalized party system’ such as that of Mozambique (Carbone 2005), executive positions come with specific legal powers over government spending and contract negotiations. To investigate this dimension, panel (b) of Table 1.6 re-runs the full LO and FE specifications with the (preferred) PEPs sample and using continuous treatment definitions, now distinguishing between offices associated with the governing party (FRELIMO) and executive offices (ministers, governors etc.). These results clearly suggest that our previous results were driven by holders of party political office. However, while currently being in executive office is not associated with any consistent positive gains in business outcomes, some advantages appear to accrue after leaving such offices. For instance, ex-executive PEPs accumulate companies and augment their brokerage positions at only slightly lower rates than current party PEPs.

Following the previous sub-section, as a second extension we aggregate the individual-level data into family dynasties, based on common surnames. For all individuals sharing the same surname we say the family was treated (politically exposed) if anyone with that surname was a PEP in a given period. And for business outcomes, we recreate the entire network graph at the family-level, effectively treating anyone with the same surname as part of one group. An additional rationale for this is that, as discussed in Section 1.4, the names in the business registry and PEP database are not always written in a consistent format. Thus, despite the normalization (and our best efforts), it is possible that either the same individual is treated as two (or more) separate units, or that two

different individuals are merged into one. Aggregating by surname avoids some of these issues, but nonetheless risks diluting the effects of being a PEP across unrelated persons and will not capture relationships that are deliberately hidden.

In reconstructing the data in this way we find a small number of very common surnames that are unlikely to encompass closely-related individuals. Thus, we drop all family dynasties with more than 200 individuals, amounting to under 10% of the aggregated sample. Taking this family-level panel, we re-run the same full LO and FE specifications as before, also continuing with the disaggregated treatments and PEP sample – i.e. here, we restrict attention to those families that at some point contain a PEP (see Appendix Tables 1.A.8 and 1.A.9 for summaries of results based on different treatment definitions and sub-samples).

Panel (c) of Table 1.6 reports these results. Estimates for holding party political office are remarkably similar to those obtained at the individual level. Considering the process of aggregation might dilute our results, adding measurement error from elision of unrelated individuals, these findings strongly confirm not only that political office holders accrue private benefits while in power, but also that such benefits go beyond individual PEPs and extend to their wider families. Thus, if anything, our earlier results may in fact be something of a lower bound on how political exposure generates private business benefits. In addition, the coefficient estimates for being a current executive office holder are now consistently positive and of a similar magnitude to party office holders. A possible explanation for this is that while executive office holders may abstain from flagrant pursuit of their personal private business interests, such activity is undertaken by family members (such as per the Santos family in Angola).

Third, we return to the basic registry data and explore whether patterns of accumulation vary between PEPs and non-PEPs across different company types – namely according to their legal form on establishment (sole-owned, joint or public) and our classification of their main sectors of activity. This amounts to considering a new set of outcomes – e.g., rather than analysing the number of companies owned in all sectors, we analyse the number of joint-stock companies, or the number of companies classified as undertaking

Table 1.8: Summary of additional regression results with disaggregated treatments, PEP sample

	(I)		(II) Legal form			(II) Sectoral classification				
	Any	Sole	Joint	Public	Biz	Trade	Ind.	Fin.	Cons.	Other
(a) Individuals, lagged outcome specification:										
Current party PEP	0.14*** (0.04)	0.06*** (0.02)	0.11*** (0.03)	0.04*** (0.01)	0.08*** (0.02)	0.01* (0.01)	0.03** (0.01)	0.02* (0.01)	0.05*** (0.01)	0.00 (0.01)
Current exec. PEP	0.03 (0.03)	-0.01 (0.01)	0.04 (0.03)	-0.01 (0.01)	0.02 (0.02)	-0.01** (0.01)	0.02** (0.01)	-0.01 (0.01)	0.01 (0.01)	-0.02* (0.01)
Ex-party PEP	-0.01 (0.02)	-0.01 (0.01)	-0.01 (0.02)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.00)	-0.01 (0.01)	-0.00 (0.01)	0.00 (0.01)
Ex-exec. PEP	0.07** (0.03)	0.02 (0.02)	0.06** (0.02)	0.02* (0.01)	0.04*** (0.02)	0.02* (0.01)	0.01 (0.01)	0.00 (0.01)	0.01 (0.01)	0.02* (0.01)
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.28	0.20	0.26	0.13	0.23	0.13	0.11	0.12	0.11	0.18
Control mean	0.10	0.04	0.08	0.02	0.05	0.01	0.01	0.01	0.01	0.02
(b) Individuals, fixed-effects specification:										
Current party PEP	0.13** (0.06)	0.06** (0.03)	0.10** (0.04)	0.02 (0.02)	0.08** (0.03)	0.02 (0.01)	0.02 (0.01)	0.01 (0.01)	0.03** (0.01)	0.02 (0.02)
Current exec. PEP	0.03 (0.05)	-0.01 (0.02)	0.05 (0.04)	-0.02 (0.01)	0.01 (0.03)	-0.01 (0.01)	0.02 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.02 (0.01)
Ex-party PEP	0.02 (0.05)	0.01 (0.02)	0.03 (0.04)	-0.01 (0.01)	0.02 (0.03)	0.03* (0.02)	0.01 (0.01)	-0.00 (0.01)	0.02 (0.01)	0.03 (0.02)
Ex-exec. PEP	0.11** (0.05)	0.07*** (0.02)	0.10** (0.05)	0.02 (0.01)	0.06* (0.03)	0.05*** (0.02)	0.02 (0.01)	0.01 (0.01)	0.03** (0.01)	0.04** (0.02)
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.29	0.19	0.27	0.13	0.23	0.13	0.11	0.12	0.10	0.17
Control mean	0.10	0.04	0.08	0.02	0.05	0.01	0.01	0.01	0.01	0.02
(c) Families, lagged outcome specification:										
Current party PEP	0.15*** (0.03)	0.08*** (0.03)	0.13*** (0.03)	0.08*** (0.02)	0.15*** (0.03)	0.05 (0.04)	0.05** (0.02)	0.07*** (0.02)	0.05** (0.02)	0.07 (0.04)
Current exec. PEP	0.15*** (0.03)	0.09*** (0.03)	0.15*** (0.03)	0.01 (0.02)	0.14*** (0.03)	-0.02 (0.05)	0.05** (0.02)	0.02 (0.02)	0.06** (0.02)	0.00 (0.05)
Ex-party PEP	0.02 (0.02)	0.00 (0.02)	0.02 (0.02)	0.00 (0.01)	0.02 (0.02)	-0.02 (0.03)	0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	0.01 (0.03)
Ex-exec. PEP	0.05** (0.02)	0.03 (0.02)	0.06*** (0.02)	0.05*** (0.02)	0.06*** (0.02)	0.02 (0.04)	0.03** (0.02)	-0.05*** (0.02)	0.01 (0.02)	0.01 (0.04)
Obs.	3,522	3,522	3,522	3,522	3,522	3,522	3,522	3,522	3,522	3,522
RMSE	0.38	0.35	0.38	0.26	0.39	0.56	0.26	0.30	0.31	0.60
Control mean	0.39	0.20	0.38	0.07	0.28	0.15	0.08	0.10	0.12	0.19
(d) Families, fixed-effects specification:										
Current party PEP	0.15*** (0.05)	0.08** (0.04)	0.12** (0.05)	0.03 (0.03)	0.16*** (0.04)	0.04 (0.06)	-0.01 (0.03)	0.07* (0.03)	0.00 (0.03)	0.03 (0.07)
Current exec. PEP	0.09** (0.04)	0.08** (0.04)	0.13*** (0.05)	-0.00 (0.03)	0.15*** (0.05)	0.02 (0.06)	0.06* (0.03)	-0.00 (0.03)	0.05 (0.03)	0.03 (0.07)
Ex-party PEP	0.04 (0.05)	-0.01 (0.04)	0.06 (0.05)	-0.05* (0.03)	0.06 (0.05)	-0.00 (0.06)	-0.03 (0.03)	-0.01 (0.03)	-0.04 (0.03)	0.00 (0.07)
Ex-exec. PEP	0.02 (0.04)	0.07* (0.04)	0.03 (0.05)	0.06* (0.03)	0.03 (0.05)	0.12* (0.07)	0.04 (0.03)	-0.09*** (0.04)	0.02 (0.04)	0.07 (0.08)
Obs.	3,522	3,522	3,522	3,522	3,522	3,522	3,522	3,522	3,522	3,522
RMSE	0.40	0.34	0.41	0.27	0.42	0.61	0.26	0.32	0.33	0.65
Control mean	0.39	0.20	0.38	0.07	0.28	0.15	0.08	0.10	0.12	0.19

significance: *p \leq 0.10, **p \leq 0.05, ***p \leq 0.01.

Source: authors' estimates from merged panel data.

Notes: table presents estimates for the PEP sample at different levels of aggregation and using different specifications, applied to counts of different company types; column (I) refers to all companies; column (II) to refers to company ownership type; column (III) refers to sectoral classification; 'control means' (counterfactuals) are averages of the outcome among non-PEPs – for the LO specification this refers to the outcome level and for the FE specification the first difference.

business services. These results are reported in Table 1.8 using both the individual and family-level samples of PEPs (as before); panels (a) and (c) refer to estimates from the full LO (for individuals and families respectively), while panels (b) and (d) refer to the FE specifications. Column (I) replicates previous analysis for all firms (number of companies); column (II) distinguishes between different firm types; and column (III) the firm classification. All sub-columns refer to separate regressions.

As expected, the broad message from this exercise is aligned with those of earlier analyses. However, taking stock of the results from the different specifications and analytical levels, we note the dominant (largest) treatment effects associated with current office holders are found in joint-stock companies, as well as in companies classified as engaged in business services ('biz'). Also, somewhat smaller but nonetheless often material positive treatment effects are found for firms classified in the construction and finance sectors. Without wishing to over-interpret these findings, they are consistent with a pattern by which politicians and entrepreneurs pool their skills; and where the contribution of PEPs derives from their contacts and political influence, not necessarily their operational/management expertise. Also in Mozambique, where the domestic manufacturing industry is small, activities in business services and construction are particularly characterised by opportunities for rent-seeking – e.g., as gatekeepers for foreign investment, privileged access to land or import contracts. Thus, our finding that current political office holders and their families accumulate companies specifically in these sectors is consistent with a pattern of rent-seeking while in public office.

1.7 Conclusion

We began by noting that the nature of the relationship between the state and the private sector is rarely one of mutual autonomy. Adding to studies on how PEPs leverage their position for personal advantage, we sought to shed light on the dynamics of state-business relationships in Mozambique, quantifying the extent to which holders of either high executive or party political office have grown their personal business empires. The hypothesis that PEPs may use their influence to accumulate wealth in the private sector

through direct business interests, particularly partnerships with other business owners (co-investments), is not new. This theme emerged as a critique of the process of privatization (Pitcher 2002) and has gained renewed force with the boom in natural resource investments over the past decade (Macuane et al. 2018; Salimo et al. 2020). Nonetheless, evidence has been patchy and largely qualitative in nature, both in Mozambique and elsewhere, often reflecting data limitations.

Our contribution has been to address this issue quantitatively, providing a comprehensive econometric analysis of the growth in the private business network capital of politically exposed persons in a low income country. We combined data on all companies formally registered in Mozambique since Independence, including their named beneficial owners, with a new database of politically exposed persons. From this, we constructed the complete network of how individuals are connected through firms, in turn allowing us to track how the influence of individuals within this network has evolved over time, as captured by different measures of their network centrality.

Based on both fixed effect and lagged outcome models, which plausibly bound the estimate of interest, we found consistent evidence of large positive effects of holding political office. On average, current office holders tend to accumulate stakes in more companies and expand their Godfather centrality at about double the counterfactual rate of non-office holders. We extended the analysis to consider whether these effects differ between party political and executive offices. Overall, the evidence points to stronger effects associated with serving senior officials of the ruling party, as well as some positive effects associated with past executive officials. We further showed these treatment effects are predominant in joint-stock companies, as well as companies active in business services and finance, which is consistent with an interpretation that PEPs earn rents as gatekeepers to private investment and government contracts.

Event study estimates supported these main results but also indicated that the largest effects emerge among individuals who accumulate multiple consecutive mandates. We furthermore showed that the estimated magnitudes of treatment effects associated with political exposure tend to increase when we aggregate the data to the family-name level,

suggesting the benefits of political office are likely to extend to family groups more broadly. As such, the main individual-level estimates probably represent a lower bound on the real private business benefits of holding political office.

In sum, this analysis deepens our understanding of how the private sector functions in Mozambique and highlights the essential political dimensions to doing business in countries with a nascent domestic private sector. We cannot say whether the dynamics we have identified have damaged economic development and growth. Nonetheless, our results do point to the prevalence of rentier-broker behaviour, as well as the ongoing absence of a strong ‘contestable’ private sector that might lobby for a fair playing-field on which to do business. This is likely to be associated with a range of inefficiencies, including higher costs of goods and services, misallocation of investment (and talent), as well as weakened innovation. None of this is likely to support a more dynamic economy in the long-run.

Appendix

1.A Additional tables

Table 1.A.1: Additional panel data descriptive statistics

	1989	1994	1999	2004	2009	2014	2019
(i) <i>Full sample:</i>							
(a)	Individuals	110,078	110,078	110,078	110,078	110,078	110,078
	Female	37,993	37,993	37,993	37,993	37,993	37,993
	In firms registry (t)	2,042	7,597	17,929	30,150	49,937	80,158
(b)	No. of firms	0.02	0.09	0.23	0.39	0.68	1.14
	Firm owner	0.02	0.07	0.16	0.27	0.45	0.73
	Multifirm	0.00	0.01	0.03	0.06	0.11	0.19
	Mean share	0.01	0.03	0.06	0.11	0.20	0.35
	nonisolate	0.01	0.03	0.08	0.14	0.23	0.34
	Closeness	0.01	0.04	0.09	0.15	0.22	0.33
	Brokerage	0.00	0.00	0.01	0.02	0.03	0.05
	Score	-0.88	-0.70	-0.35	0.06	0.75	1.77
(ii) <i>PEPs sample:</i>							
(a)	Individuals	830	830	830	830	830	830
	Female	262	262	262	262	262	262
	In firms registry (t)	11	98	162	208	246	294
	In PEPs registry (t)	316	414	446	588	627	676
	Current exec. PEP	76	55	52	68	79	80
	Current party PEP	252	270	174	177	180	74
	Current PEP	294	301	213	225	236	134
(b)	No. of firms	0.01	0.21	0.46	0.68	0.98	1.34
	Firm owner	0.01	0.12	0.20	0.25	0.30	0.35
	Multifirm	0.00	0.04	0.09	0.13	0.17	0.23
	Mean share	0.01	0.04	0.07	0.08	0.10	0.12
	nonisolate	0.00	0.07	0.13	0.18	0.23	0.28
	Closeness	0.01	0.06	0.09	0.11	0.12	0.14
	Brokerage	0.00	0.02	0.04	0.05	0.08	0.10
	Score	-0.91	-0.45	-0.03	0.29	0.61	0.98

Notes: table presents summary statistics for full and PEP sample (panels i and ii); variables in sub-panels (a) are counts and in sub-panels (b) are outcome means, including zero values where individuals are not active firm owners; see also Table 1.3 in the text.

Table 1.A.2: Pairwise correlations across outcomes

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
(a) Companies	1.00	0.62	0.69	0.42	0.51	0.43	0.67	0.80		
(b) Hasfirm	0.62	1.00	0.41	0.73	0.59	0.70	0.27	0.88		
(c) Multifirm	0.69	0.41	1.00	0.25	0.43	0.31	0.66	0.74		
(d) Avshare	0.42	0.73	0.25	1.00	0.10	0.16	0.08	0.53		
(e) Nonisolate	0.51	0.59	0.43	0.10	1.00	0.40	0.40	0.72		
(f) Closeness	0.43	0.70	0.31	0.16	0.40	1.00	0.20	0.68		
(g) Brokerage	0.67	0.27	0.66	0.08	0.40	0.20	1.00	0.63		
(h) Score	0.80	0.88	0.74	0.53	0.72	0.68	0.63	1.00		

Notes: correlations are calculated for active firm owners only, full sample.

Table 1.A.3: Regression estimates for number of companies owned, PEP sample

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
<i>(a) Binary treatments:</i>							
Current PEP	0.09*** (0.02)	0.07*** (0.02)	0.07*** (0.02)	0.06*** (0.02)	0.07*** (0.01)	0.06*** (0.01)	0.04** (0.02)
Ex-PEP	-0.03* (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.01 (0.01)	-0.03** (0.01)	-0.02 (0.02)
Female		-0.05*** (0.01)	-0.05*** (0.01)	-0.04*** (0.01)	-0.01 (0.01)	-0.00 (0.01)	
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.32	0.32	0.32	0.32	0.29	0.28	0.29
<i>(b) Fractional treatments:</i>							
Current PEP	0.14*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.09*** (0.02)	0.08*** (0.02)	0.06*** (0.02)
Ex-PEP	-0.01 (0.01)	-0.03** (0.01)	-0.03** (0.01)	-0.04*** (0.01)	0.00 (0.01)	-0.01 (0.01)	0.02 (0.02)
Female		-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.01 (0.01)	0.00 (0.01)	
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.32	0.32	0.32	0.32	0.29	0.28	0.29
Period effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	Yes	Yes	Yes	Yes	Yes
Initial outcome	No	No	Yes	Yes	Yes	Yes	No
Lagged outcome	No	No	No	Yes	Yes	Yes	No
Person-type effects	No	No	No	No	Yes	Yes	Yes
Firm cohort effects	No	No	No	No	No	Yes	Yes
Individual effects	No	No	No	No	No	No	Yes

significance: *p < 0.10, **p < 0.05, ***p < 0.01.

Note: table reports selected coefficients for the first difference of IHS-transform of the number of firms owned per person across 5-year periods for the PEP sample; panels (a) and (b) define treatments in binary and continuous (share) terms respectively; footer indicates specification model; columns (IV)-(VI) represent a lagged outcome model specification; column (VII) contains individual fixed-effects; period fixed-effects included throughout; standard errors (in parentheses) clustered by individuals.

Table 1.A.4: Regression estimates for Godfather centrality, PEP sample

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
<i>(a) Binary treatments:</i>							
Current PEP	0.20*** (0.04)	0.13*** (0.03)	0.13*** (0.03)	0.14*** (0.03)	0.13*** (0.03)	0.10*** (0.03)	0.07 (0.04)
Ex-PEP	-0.04 (0.03)	-0.07** (0.03)	-0.07** (0.03)	-0.07** (0.03)	-0.03 (0.03)	-0.07** (0.03)	-0.03 (0.06)
Female		-0.06*** (0.02)	-0.06*** (0.02)	-0.07*** (0.02)	-0.02 (0.02)	-0.00 (0.02)	
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.77	0.76	0.76	0.76	0.74	0.73	0.73
<i>(b) Fractional treatments:</i>							
Current PEP	0.35*** (0.05)	0.26*** (0.05)	0.26*** (0.05)	0.26*** (0.05)	0.22*** (0.05)	0.19*** (0.05)	0.11** (0.06)
Ex-PEP	-0.02 (0.03)	-0.06** (0.03)	-0.06** (0.03)	-0.05* (0.03)	-0.02 (0.03)	-0.06** (0.03)	-0.03 (0.06)
Female		-0.06*** (0.02)	-0.06*** (0.02)	-0.06*** (0.02)	-0.02 (0.02)	-0.00 (0.02)	
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980
RMSE	0.77	0.76	0.76	0.76	0.74	0.73	0.73
Period effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	Yes	Yes	Yes	Yes	Yes
Initial outcome	No	No	Yes	Yes	Yes	Yes	No
Lagged outcome	No	No	No	Yes	Yes	Yes	No
Person-type effects	No	No	No	No	Yes	Yes	Yes
Firm cohort effects	No	No	No	No	No	Yes	Yes
Individual effects	No	No	No	No	No	No	Yes

significance: *p < 0.10, **p < 0.05, ***p < 0.01.

Note: table reports selected coefficients for the first difference of IHS-transform of the Godfather centrality metric per person across 5-year periods for the PEP sample; panels (a) and (b) define treatments in binary and continuous (share) terms respectively; footer indicates specification model; columns (IV)-(VI) represent a lagged outcome model specification; column (VII) contains individual fixed-effects; period fixed-effects included throughout; standard errors (in parentheses) clustered by individuals.

Table 1.A.5: Summary of regression results for currently holding office, alternative samples and treatment definitions

Sample	(I) Companies		(II) Degree		(III) Closeness		(IV) Brokerage		(V) Godfather		(VI) Decay	
	LO	FE										
(a) Binary treatments:												
All	0.080 (0.000) [0.000]	0.040 (0.020) [0.035]	0.105 (0.000) [0.000]	0.055 (0.101) [0.142]	0.013 (0.011) [0.025]	0.012 (0.149) [0.174]	0.014 (0.000) [0.002]	0.015 (0.014) [0.027]	0.122 (0.000) [0.001]	0.072 (0.115) [0.149]	0.133 (0.000) [0.000]	0.066 (0.163) [0.182]
Owners	0.163 (0.000) [0.000]	0.089 (0.037) [0.055]	0.227 (0.000) [0.001]	0.134 (0.110) [0.147]	0.027 (0.025) [0.042]	0.030 (0.152) [0.174]	0.030 (0.002) [0.007]	0.035 (0.020) [0.034]	0.257 (0.001) [0.004]	0.172 (0.134) [0.165]	0.287 (0.000) [0.001]	0.156 (0.196) [0.209]
PEPs	0.055 (0.000) [0.000]	0.043 (0.012) [0.025]	0.087 (0.000) [0.001]	0.050 (0.135) [0.162]	0.014 (0.009) [0.022]	0.013 (0.108) [0.148]	0.013 (0.001) [0.004]	0.014 (0.012) [0.025]	0.101 (0.001) [0.004]	0.066 (0.120) [0.152]	0.113 (0.000) [0.002]	0.059 (0.216) [0.221]
PEP-Owners	0.115 (0.000) [0.001]	0.092 (0.032) [0.049]	0.194 (0.001) [0.004]	0.115 (0.175) [0.191]	0.032 (0.019) [0.035]	0.034 (0.096) [0.140]	0.026 (0.009) [0.021]	0.030 (0.029) [0.046]	0.204 (0.010) [0.023]	0.132 (0.210) [0.219]	0.255 (0.002) [0.007]	0.121 (0.319) [0.319]
(b) Fractional treatments:												
All	0.099 (0.000) [0.000]	0.059 (0.008) [0.017]	0.151 (0.000) [0.000]	0.079 (0.054) [0.025]	0.017 (0.015) [0.051]	0.021 (0.039) [0.000]	0.023 (0.000) [0.000]	0.021 (0.007) [0.015]	0.220 (0.000) [0.000]	0.124 (0.033) [0.046]	0.179 (0.000) [0.000]	0.074 (0.188) [0.201]
Owners	0.177 (0.000) [0.000]	0.110 (0.023) [0.033]	0.272 (0.000) [0.000]	0.155 (0.087) [0.100]	0.031 (0.022) [0.034]	0.042 (0.056) [0.069]	0.039 (0.001) [0.002]	0.041 (0.014) [0.026]	0.376 (0.000) [0.000]	0.229 (0.074) [0.086]	0.322 (0.000) [0.001]	0.134 (0.294) [0.300]
PEPs	0.076 (0.000) [0.000]	0.063 (0.004) [0.009]	0.122 (0.000) [0.000]	0.074 (0.073) [0.088]	0.019 (0.009) [0.018]	0.023 (0.015) [0.025]	0.022 (0.000) [0.001]	0.020 (0.008) [0.016]	0.192 (0.000) [0.000]	0.113 (0.042) [0.054]	0.141 (0.001) [0.003]	0.064 (0.259) [0.270]
PEP-Owners	0.134 (0.000) [0.001]	0.115 (0.019) [0.030]	0.227 (0.001) [0.022]	0.134 (0.145) [0.162]	0.037 (0.014) [0.026]	0.049 (0.021) [0.032]	0.037 (0.002) [0.005]	0.035 (0.029) [0.041]	0.320 (0.001) [0.002]	0.173 (0.147) [0.160]	0.268 (0.003) [0.008]	0.091 (0.481) [0.481]

Note: this table summarises the coefficient estimates for being a current PEP across different outcomes (in the main columns), different estimators (LO and FE) as well as with different samples (in the rows); values in parentheses give the probability the reported coefficient is different from zero; values in brackets correct for the false discovery rate; panel (a) employs a binary treatment variable and panel (b) the fractional counterpart.

Table 1.A.6: Summary of regression results for previously holding office, alternative samples and treatment definitions

Sample	(I) Companies		(II) Degree		(III) Closeness		(IV) Brokerage		(V) Godfather		(VI) Decay	
	LO	FE										
(a) Binary treatments:												
All	-0.009 (0.597) [1.000]	-0.018 (0.425) [1.000]	-0.014 (0.515) [0.939]	-0.021 (0.626) [0.944]	-0.001 (0.885) [1.000]	-0.006 (0.593) [1.000]	-0.004 (0.239) [0.891]	0.003 (0.724) [0.524]	-0.049 (0.076) [0.877]	-0.027 (0.658) [1.000]	-0.018 (0.548) [0.882]	-0.033 (0.602) [1.000]
Owners	-0.019 (0.675) [0.875]	-0.054 (0.341) [1.000]	-0.031 (0.630) [0.916]	-0.055 (0.619) [0.990]	-0.000 (0.984) [1.000]	-0.017 (0.551) [1.000]	-0.011 (0.292) [0.892]	0.006 (0.762) [0.655]	-0.130 (0.109) [0.892]	-0.073 (0.632) [0.892]	-0.041 (0.643) [0.882]	-0.081 (0.612) [1.000]
PEPs	-0.028 (0.015) [0.737]	-0.018 (0.430) [1.000]	-0.011 (0.607) [1.000]	-0.026 (0.540) [1.000]	-0.000 (0.998) [0.998]	-0.007 (0.478) [1.000]	-0.007 (0.055) [0.524]	0.003 (0.735) [0.882]	-0.066 (0.020) [0.491]	-0.027 (0.625) [0.967]	-0.009 (0.764) [0.874]	-0.038 (0.542) [1.000]
PEP-Owners	-0.082 (0.021) [0.336]	-0.054 (0.337) [1.000]	-0.027 (0.689) [0.870]	-0.071 (0.520) [1.000]	0.002 (0.901) [0.940]	-0.020 (0.463) [1.000]	-0.022 (0.056) [0.450]	0.005 (0.817) [0.912]	-0.201 (0.022) [0.259]	-0.085 (0.547) [1.000]	-0.017 (0.855) [0.933]	-0.101 (0.526) [1.000]
(b) Fractional treatments:												
All	0.012 (0.423) [1.000]	0.021 (0.367) [1.000]	0.003 (0.886) [1.000]	0.013 (0.762) [1.000]	0.003 (0.527) [1.000]	0.008 (0.451) [1.000]	-0.003 (0.384) [1.000]	0.004 (0.611) [1.000]	-0.040 (0.120) [1.000]	-0.039 (0.511) [1.000]	0.002 (0.931) [1.000]	0.008 (0.898) [1.000]
Owners	0.021 (0.625) [1.000]	0.031 (0.592) [1.000]	0.000 (0.996) [1.000]	0.016 (0.882) [1.000]	0.006 (0.634) [1.000]	0.015 (0.582) [1.000]	-0.009 (0.375) [1.000]	0.008 (0.696) [1.000]	-0.120 (0.119) [1.000]	-0.118 (0.448) [1.000]	-0.003 (0.973) [1.000]	-0.006 (0.971) [1.000]
PEPs	-0.012 (0.272) [1.000]	0.019 (0.407) [1.000]	0.003 (0.867) [1.000]	0.010 (0.812) [1.000]	0.003 (0.482) [1.000]	0.004 (0.687) [1.000]	-0.005 (0.133) [1.000]	0.006 (0.433) [1.000]	-0.055 (0.038) [0.906]	-0.025 (0.653) [1.000]	0.010 (0.717) [1.000]	0.009 (0.889) [1.000]
PEP-Owners	-0.043 (0.205) [1.000]	0.032 (0.580) [1.000]	0.000 (0.998) [0.998]	0.008 (0.939) [1.000]	0.011 (0.577) [1.000]	-0.018 (0.687) [1.000]	0.010 (0.099) [1.000]	-0.188 (0.612) [1.000]	-0.107 (0.026) [1.000]	0.023 (0.451) [1.000]	-0.012 (0.808) [1.000]	-0.039 (0.939) [1.000]

Note: this table summarises the coefficient estimates for being an ex-PEP across different outcomes (in the main columns), different estimators (LO and FE) as well as with different samples (in the rows); values in parentheses give the probability the reported coefficient is different from zero; values in brackets correct for the false discovery rate; panel (a) employs a binary treatment variable and panel (b) the fractional counterpart.

Table 1.A.7: Robustness analysis for synthetic business network capital, PEP sample, FE specification

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
(a) Exclude PEP year cohorts:								
Current PEP	1.17** (0.52)	1.25** (0.52)	1.16** (0.51)	1.42*** (0.50)	2.11*** (0.64)	1.24** (0.54)	1.03** (0.50)	1.50*** (0.56)
Ex-PEP	-0.34 (0.58)	-0.03 (0.53)	0.43 (0.51)	0.01 (0.49)	0.57 (0.74)	0.32 (0.55)	-0.02 (0.52)	0.60 (0.53)
Obs.	3,960	4,104	4,392	4,788	4,128	4,746	4,686	4,056
Cohort year	1980	1985	1990	1995	2000	2005	2010	2015
(b) Exclude PEP time span cohorts:								
Current PEP	1.07** (0.50)	1.27** (0.52)	1.71*** (0.56)	1.84*** (0.60)	1.07** (0.52)	0.79 (0.49)	1.57*** (0.54)	1.47*** (0.51)
Ex-PEP	-0.28 (0.53)	0.23 (0.53)	0.61 (0.64)	0.39 (0.58)	-0.10 (0.55)	0.14 (0.52)	0.17 (0.52)	0.33 (0.51)
Obs.	4,404	4,248	4,476	4,302	4,188	4,302	4,464	4,476
Cohort max. span	3	4	5	6	8	14	20	53
(c) Exclude influential units:								
Current PEP	1.16*** (0.35)	1.43*** (0.49)	1.55*** (0.48)	1.45*** (0.48)	1.34*** (0.49)	1.41*** (0.48)	1.08** (0.48)	1.54*** (0.46)
Ex-PEP	0.17 (0.31)	0.17 (0.50)	0.35 (0.47)	0.30 (0.50)	0.17 (0.50)	0.32 (0.50)	0.18 (0.48)	0.35 (0.47)
Obs.	3,918	4,890	4,830	4,842	4,980	4,836	4,758	4,800
(d) Fix autoregressive parameter:								
Current PEP	1.80*** (0.52)	1.72*** (0.50)	1.64*** (0.49)	1.55*** (0.49)	1.47*** (0.49)	1.38*** (0.49)	1.30*** (0.49)	1.22** (0.50)
Ex-PEP	1.10** (0.55)	0.93* (0.53)	0.77 (0.52)	0.60 (0.51)	0.43 (0.50)	0.26 (0.50)	0.10 (0.51)	-0.07 (0.51)
Obs.	4,980	4,980	4,980	4,980	4,980	4,980	4,980	4,980
$\theta + e$	0.60	0.67	0.75	0.82	0.89	0.96	1.03	1.10
e	-0.25	-0.18	-0.11	-0.04	0.04	0.11	0.18	0.25
(e) Family spillovers:								
Current PEP	1.65*** (0.61)	0.71*** (0.26)	0.51*** (0.20)	0.41*** (0.15)	0.38*** (0.14)	0.42*** (0.12)	0.45*** (0.11)	0.45*** (0.10)
Ex-PEP	0.22 (0.65)	0.42 (0.30)	0.46** (0.22)	0.27 (0.18)	0.26* (0.15)	0.27* (0.14)	0.29** (0.13)	0.27** (0.12)
Obs.	86,412	86,412	86,412	86,412	86,412	86,412	86,412	86,412
ρ	0.00	0.14	0.29	0.43	0.57	0.71	0.86	1.00

significance: *p < 0.10, **p < 0.05, ***p < 0.01.

Notes: this table replicates Table 1.7 in the text, now applying the FE rather than LO estimator.

Table 1.A.8: Summary of regression results for currently holding office, alternative samples and treatment definitions, family-level panel

Sample	(I) Companies		(II) Degree		(III) Closeness		(IV) Brokerage		(V) Godfather		(VI) Decay	
	LO	FE	LO	FE	LO	FE	LO	FE	LO	FE	LO	FE
(a) Binary treatments:												
All	0.153 (0.000) [0.000]	0.080 (0.002) [0.005]	0.163 (0.000) [0.000]	0.083 (0.054) [0.072]	0.004 (0.348) [0.451]	-0.001 (0.847) [0.847]	0.026 (0.000) [0.000]	0.024 (0.023) [0.034]	0.268 (0.000) [0.000]	0.221 (0.009) [0.017]	0.157 (0.013) [0.023]	0.065 (0.517) [0.621]
Owners	0.172 (0.000) [0.000]	0.092 (0.003) [0.006]	0.198 (0.000) [0.000]	0.103 (0.047) [0.068]	0.004 (0.431) [0.531]	-0.002 (0.748) [0.781]	0.033 (0.000) [0.000]	0.032 (0.014) [0.022]	0.334 (0.000) [0.000]	0.286 (0.005) [0.011]	0.176 (0.022) [0.034]	0.058 (0.639) [0.697]
PEPs	0.111 (0.000) [0.000]	0.080 (0.002) [0.005]	0.143 (0.000) [0.000]	0.084 (0.050) [0.071]	0.004 (0.393) [0.496]	-0.003 (0.647) [0.691]	0.032 (0.000) [0.000]	0.027 (0.008) [0.015]	0.292 (0.000) [0.000]	0.248 (0.002) [0.005]	0.176 (0.007) [0.015]	0.055 (0.580) [0.679]
PEP-Owners	0.135 (0.000) [0.000]	0.090 (0.003) [0.007]	0.171 (0.000) [0.000]	0.101 (0.052) [0.072]	0.003 (0.586) [0.670]	-0.002 (0.780) [0.797]	0.037 (0.000) [0.000]	0.031 (0.013) [0.023]	0.342 (0.000) [0.000]	0.275 (0.004) [0.008]	0.196 (0.013) [0.022]	0.060 (0.616) [0.688]
(b) Fractional treatments:												
All	0.219 (0.000) [0.000]	0.130 (0.000) [0.000]	0.248 (0.060) [0.084]	0.105 (0.131) [0.165]	0.008 (0.917) [0.957]	-0.001 (0.917) [0.957]	0.045 (0.000) [0.005]	0.041 (0.003) [0.005]	0.426 (0.000) [0.000]	0.307 (0.006) [0.009]	0.293 (0.001) [0.001]	0.136 (0.302) [0.345]
Owners	0.246 (0.000) [0.000]	0.147 (0.000) [0.001]	0.285 (0.061) [0.084]	0.123 (0.159) [0.196]	0.009 (0.806) [0.860]	-0.002 (0.806) [0.860]	0.053 (0.000) [0.000]	0.051 (0.002) [0.003]	0.493 (0.000) [0.000]	0.379 (0.004) [0.006]	0.328 (0.001) [0.002]	0.133 (0.393) [0.429]
PEPs	0.173 (0.000) [0.000]	0.131 (0.000) [0.000]	0.221 (0.059) [0.086]	0.105 (0.103) [0.134]	0.009 (0.988) [0.988]	-0.000 (0.988) [0.988]	0.049 (0.000) [0.000]	0.041 (0.002) [0.003]	0.435 (0.000) [0.000]	0.300 (0.004) [0.006]	0.317 (0.000) [0.000]	0.146 (0.264) [0.309]
PEP-Owners	0.202 (0.000) [0.000]	0.143 (0.000) [0.001]	0.254 (0.077) [0.103]	0.116 (0.165) [0.198]	0.009 (0.958) [0.979]	0.001 (0.000) [0.000]	0.055 (0.003) [0.005]	0.045 (0.000) [0.000]	0.491 (0.000) [0.000]	0.321 (0.008) [0.012]	0.362 (0.000) [0.000]	0.153 (0.325) [0.363]

Note: this table summarises the coefficient estimates for being a current PEP across different outcomes (in the main columns), different estimators (LO and FE) as well as with different samples (in the rows); values in parentheses give the probability the reported coefficient is different from zero; values in brackets correct for the false discovery rate; panel (a) employs a binary treatment variable and panel (b) the continuous counterpart.

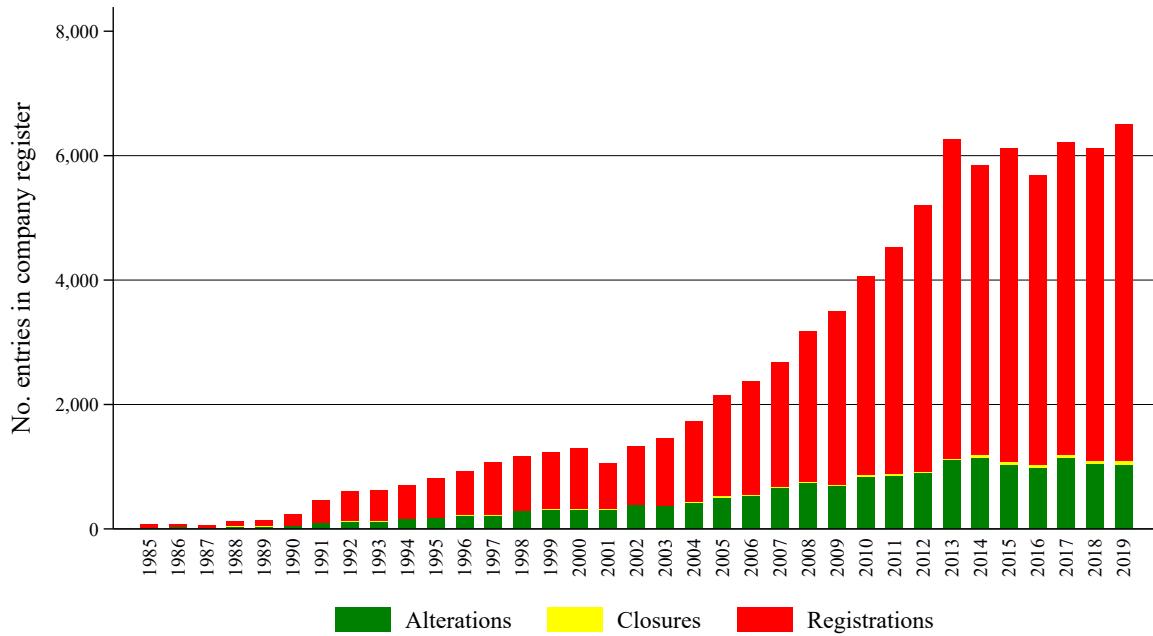
Table 1.A.9: Summary of regression results for previously holding office, alternative samples and treatment definitions, family-level panel

Sample	(I) Companies		(II) Degree		(III) Closeness		(IV) Brokerage		(V) Godfather		(VI) Decay	
	LO	FE	LO	FE	LO	FE	LO	FE	LO	FE	LO	FE
(a) Binary treatments:												
All	0.038 (0.079) [1.000]	0.012 (0.726) [1.000]	0.031 (0.308) [1.000]	0.005 (0.933) [0.995]	-0.004 (0.299) [1.000]	-0.009 (0.344) [1.000]	0.003 (0.680) [0.989]	0.008 (0.564) [0.967]	0.043 (0.389) [0.983]	0.122 (0.265) [1.000]	0.001 (0.982) [1.000]	-0.079 (0.582) [0.964]
Owners	0.039 (0.169) [1.000]	-0.004 (0.921) [1.000]	0.023 (0.559) [0.995]	-0.022 (0.770) [1.000]	-0.006 (0.226) [1.000]	-0.014 (0.222) [0.990]	-0.000 (0.768) [1.000]	0.005 (0.665) [0.998]	0.028 (0.369) [1.000]	0.121 (0.369) [1.000]	-0.021 (0.805) [1.000]	-0.143 (0.419) [0.957]
PEPs	0.009 (0.616) [0.986]	0.010 (0.762) [1.000]	0.007 (0.832) [0.975]	0.007 (0.912) [1.000]	-0.009 (0.047) [1.000]	-0.011 (0.226) [1.000]	0.006 (0.360) [1.000]	0.011 (0.402) [0.965]	0.043 (0.429) [0.935]	0.153 (0.132) [1.000]	-0.033 (0.620) [0.960]	-0.095 (0.498) [1.000]
PEP-Owners	0.015 (0.553) [1.000]	-0.001 (0.974) [1.000]	0.005 (0.917) [1.000]	-0.016 (0.829) [0.995]	-0.011 (0.069) [1.000]	-0.016 (0.136) [1.000]	0.009 (0.365) [1.000]	0.010 (0.533) [1.000]	0.051 (0.501) [1.000]	0.171 (0.174) [1.000]	-0.023 (0.811) [0.999]	-0.155 (0.374) [0.998]
(b) Fractional treatments:												
All	0.051 (0.017) [0.838]	0.023 (0.530) [1.000]	0.025 (0.398) [1.000]	-0.041 (0.504) [1.000]	-0.002 (0.619) [1.000]	-0.005 (0.632) [1.000]	0.003 (0.688) [1.000]	0.002 (0.910) [1.000]	0.012 (0.805) [1.000]	-0.009 (0.938) [0.978]	0.017 (0.779) [1.000]	-0.071 (0.632) [1.000]
Owners	0.050 (0.085) [1.000]	0.009 (0.844) [1.000]	0.019 (0.641) [1.000]	-0.066 (0.384) [1.000]	-0.004 (0.470) [1.000]	-0.009 (0.465) [1.000]	0.001 (0.940) [0.960]	0.001 (0.974) [0.974]	-0.005 (0.974) [0.997]	-0.017 (0.934) [1.000]	-0.009 (0.912) [1.000]	-0.143 (0.433) [1.000]
PEPs	0.022 (0.234) [1.000]	0.023 (0.540) [1.000]	0.008 (0.794) [1.000]	-0.036 (0.554) [1.000]	-0.006 (0.164) [1.000]	-0.008 (0.385) [1.000]	0.008 (0.227) [1.000]	0.009 (0.544) [1.000]	0.036 (0.492) [1.000]	0.057 (0.607) [1.000]	-0.007 (0.922) [1.000]	-0.095 (0.512) [1.000]
PEP-Owners	0.030 (0.267) [1.000]	0.013 (0.768) [1.000]	0.005 (0.903) [1.000]	-0.060 (0.431) [1.000]	-0.009 (0.157) [1.000]	-0.011 (0.354) [1.000]	0.011 (0.273) [1.000]	0.006 (0.721) [1.000]	0.037 (0.626) [1.000]	0.037 (0.788) [1.000]	-0.010 (0.918) [1.000]	-0.147 (0.415) [1.000]

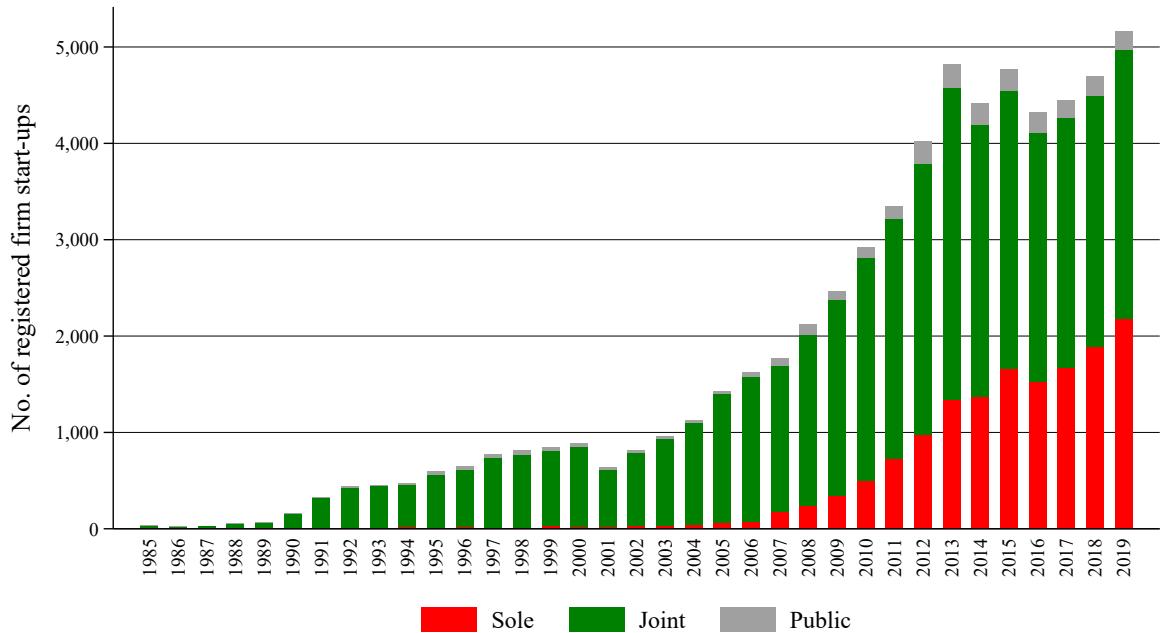
Note: this table summarises the coefficient estimates for being an ex-PEP across different outcomes (in the main columns), different estimators (LO and FE) as well as with different samples (in the rows); values in parentheses give the probability the reported coefficient is different from zero; values in brackets correct for the false discovery rate; panel (a) employs a binary treatment variable and panel (b) the continuous counterpart.

1.B Additional figures

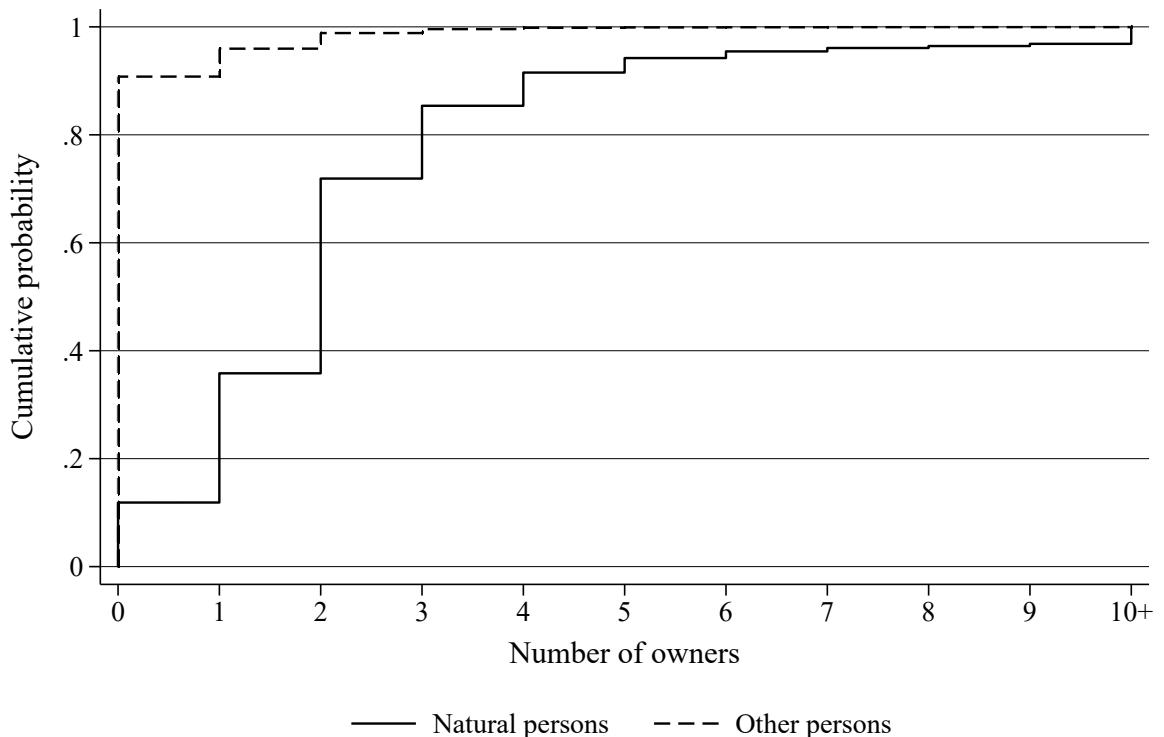
Figure 1.B.1: Types of entries in business register



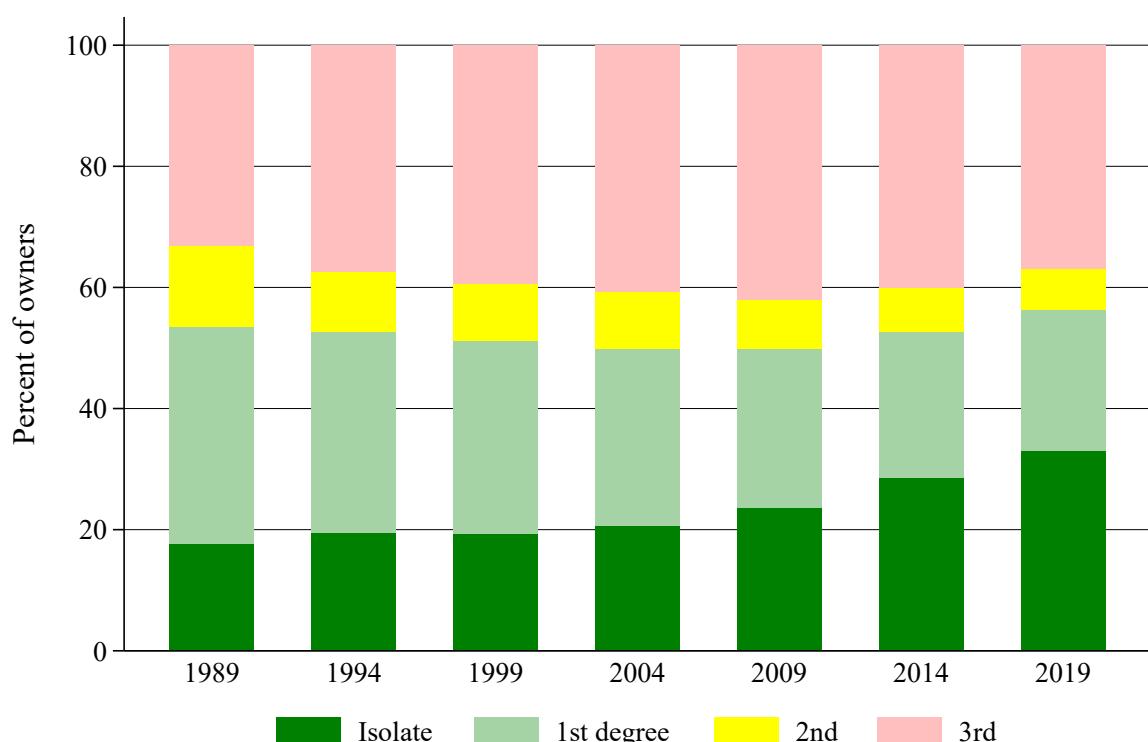
Note: the figure indicates the total number of unique entries per year in the official gazette (BdR3) reporting the establishment (start-up), alteration or closure of private firms.

Figure 1.B.2: Type of registered firm

Note: the figure indicates the legal type of all private firms established in each year, according to the official gazette (BdR3).

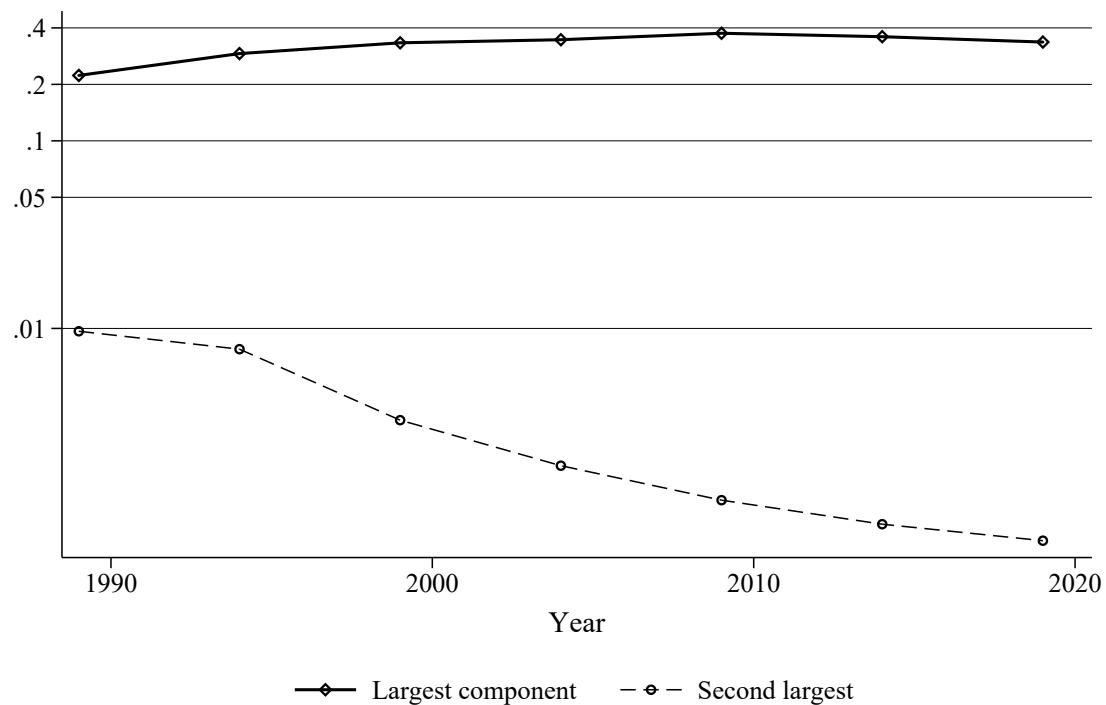
Figure 1.B.3: Distribution of no. owners per firm, full sample

Note: the figure plots the cumulative distribution of all unique firms in the register (up to 2019) according to the number owners of each type (natural persons and other owners), according to the official gazette (BdR3).

Figure 1.B.4: Classification of active firm owners by maximum degree

Note: the figure plots the proportion of all active firm owners in each period, classified according to their maximum degree (number of direct business partners), where an isolate indicates zero direct partners.

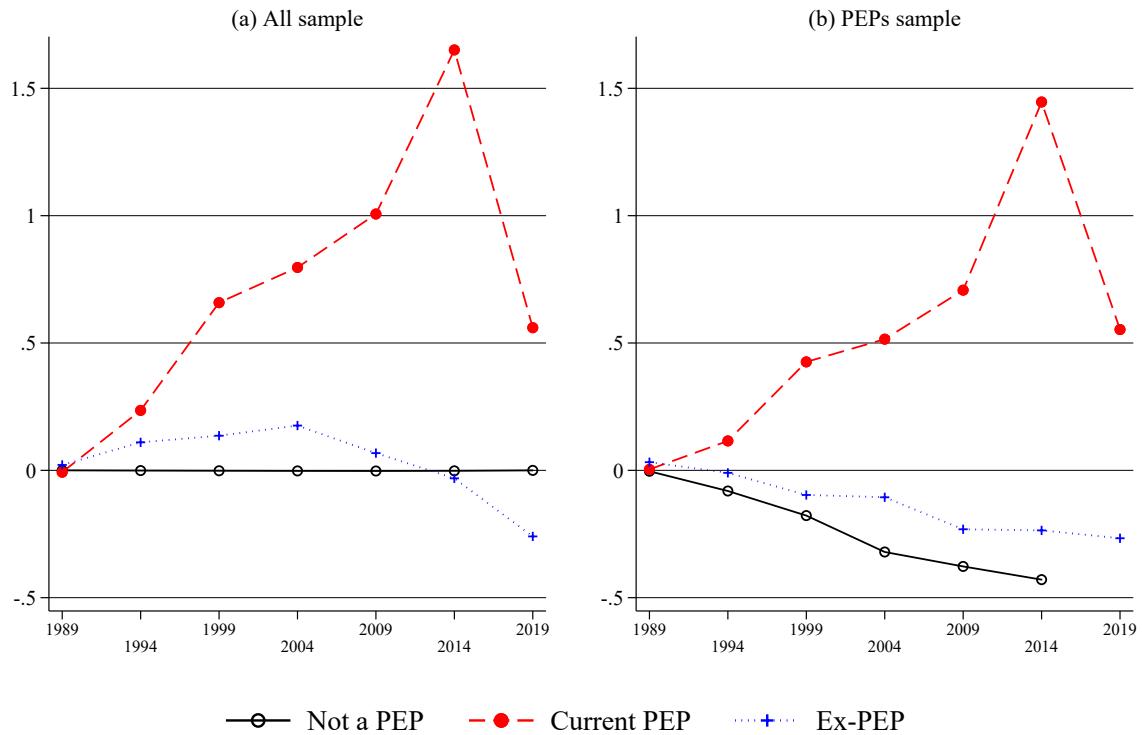
Figure 1.B.5: Proportion of firms belonging to largest sub-network components or isolated nodes



Note: the figure shows the share of unique individuals contained in the largest and second largest components of the network in each period.

Figure 1.B.6: Comparison of outcomes over time across PEP categories

(i) *No. of companies:*



(ii) *Degree:*

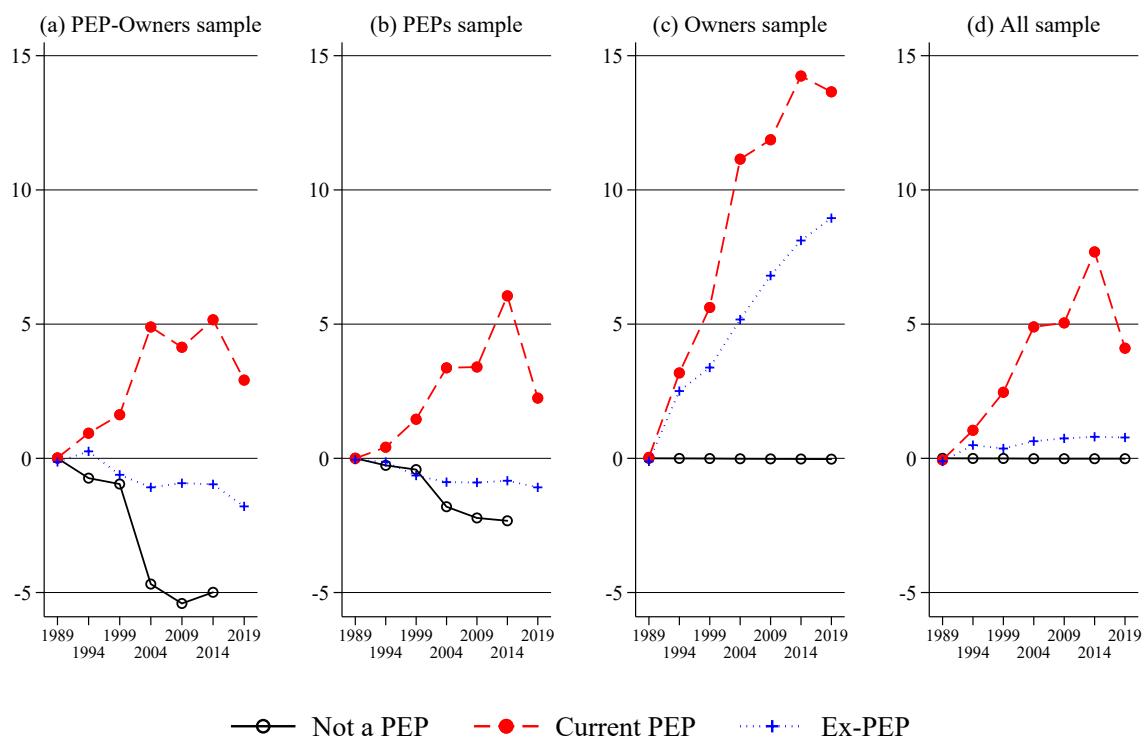
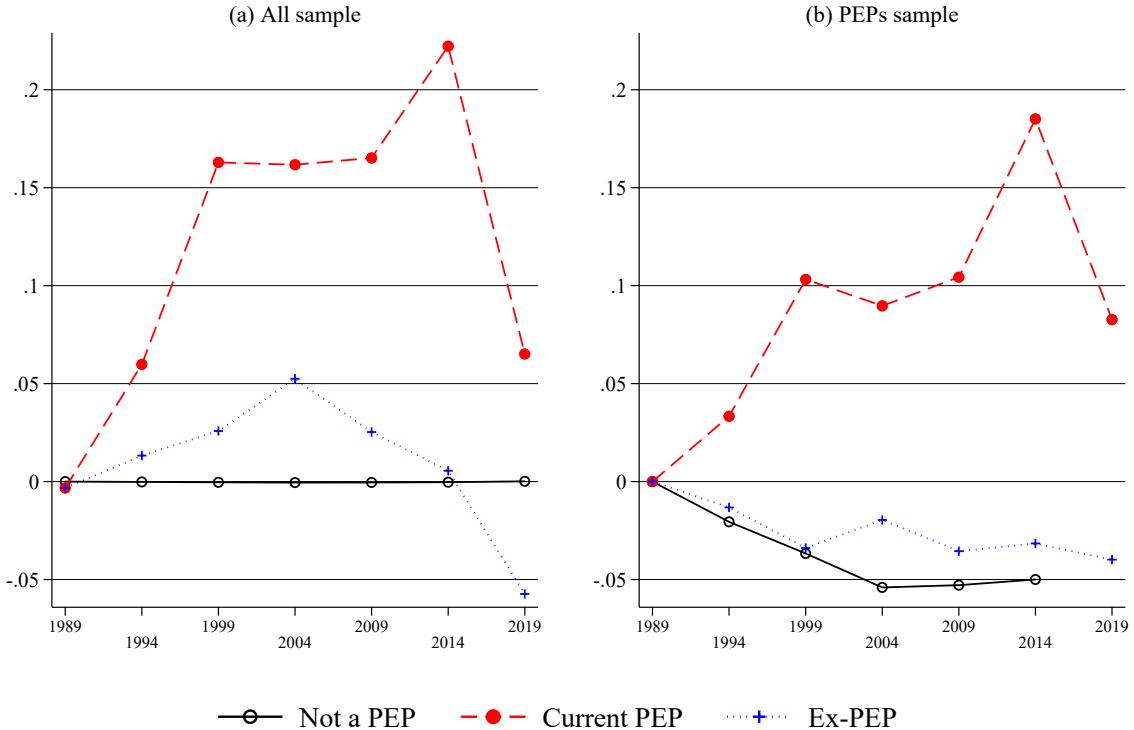


Figure 1.B.6: Comparison of outcomes over time, across different PEP categories using alternative samples (contd.)

(iii) *Owes multiple companies:*



(iv) *Isolate:*

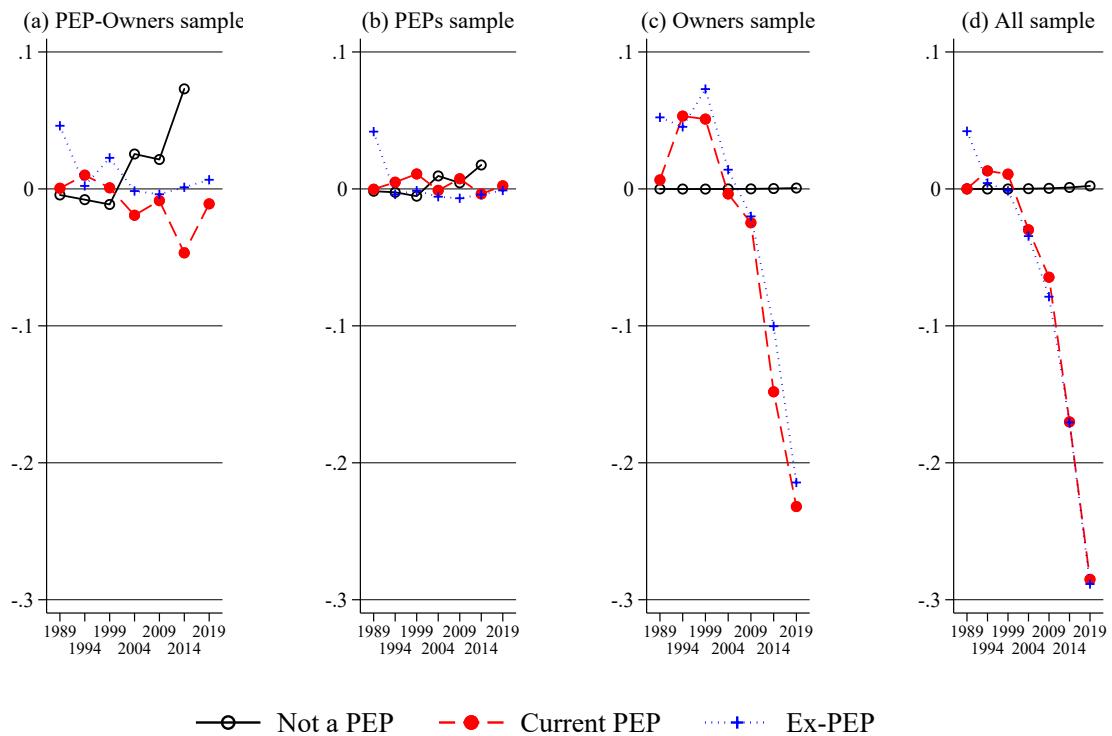
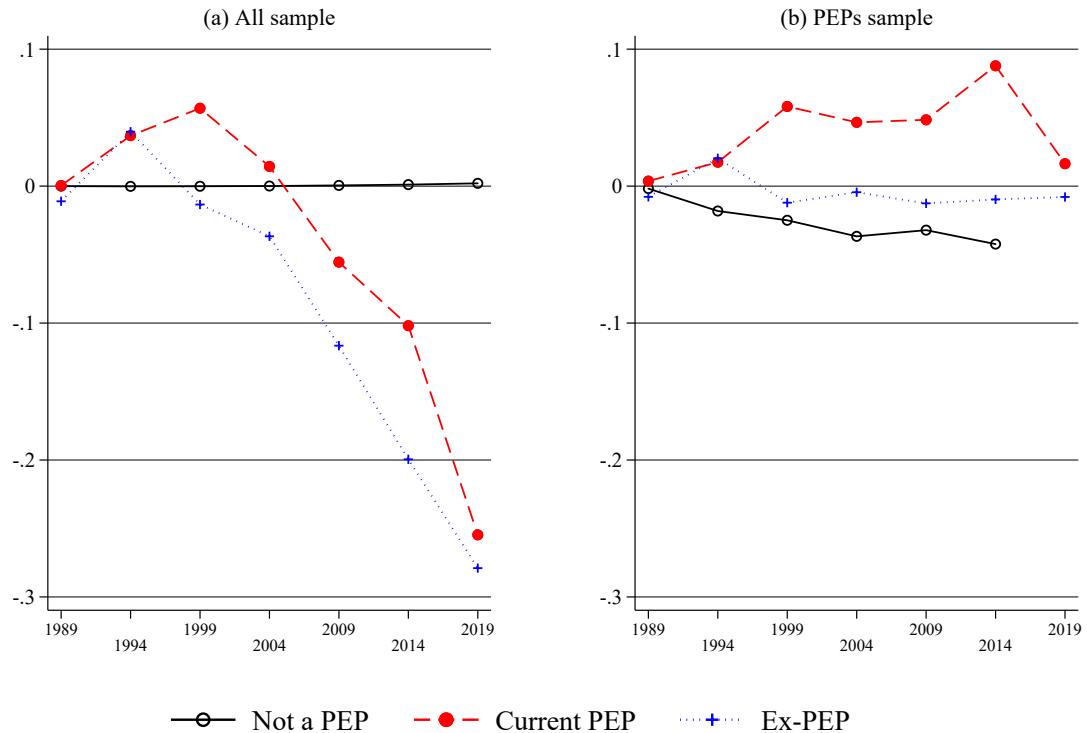


Figure 1.B.6: Comparison of outcomes over time, across different PEP categories using alternative samples (contd.)

(v) *Closeness:*



(vi) *Brokerage:*

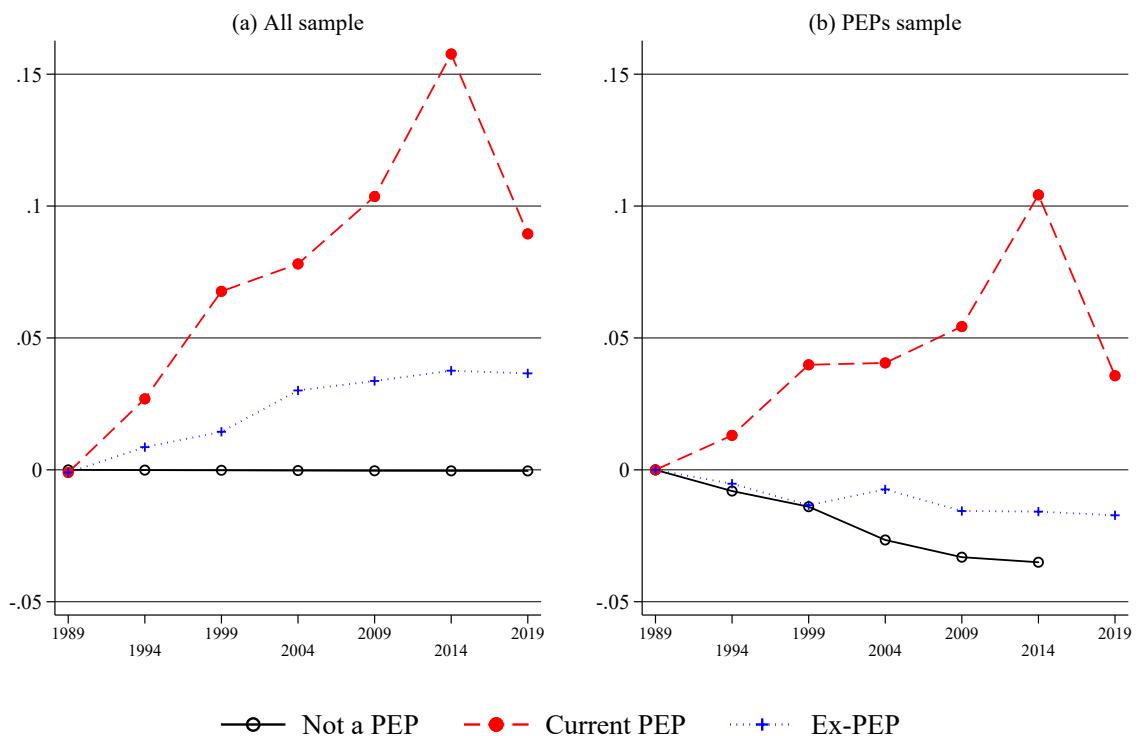
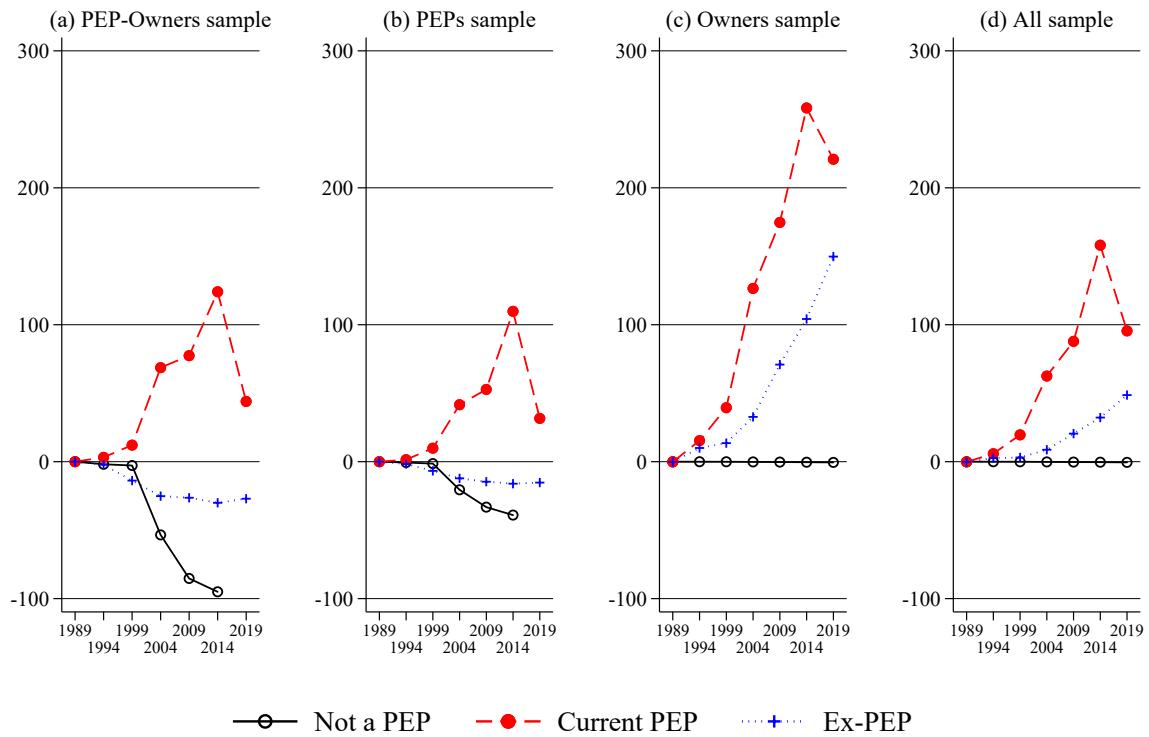
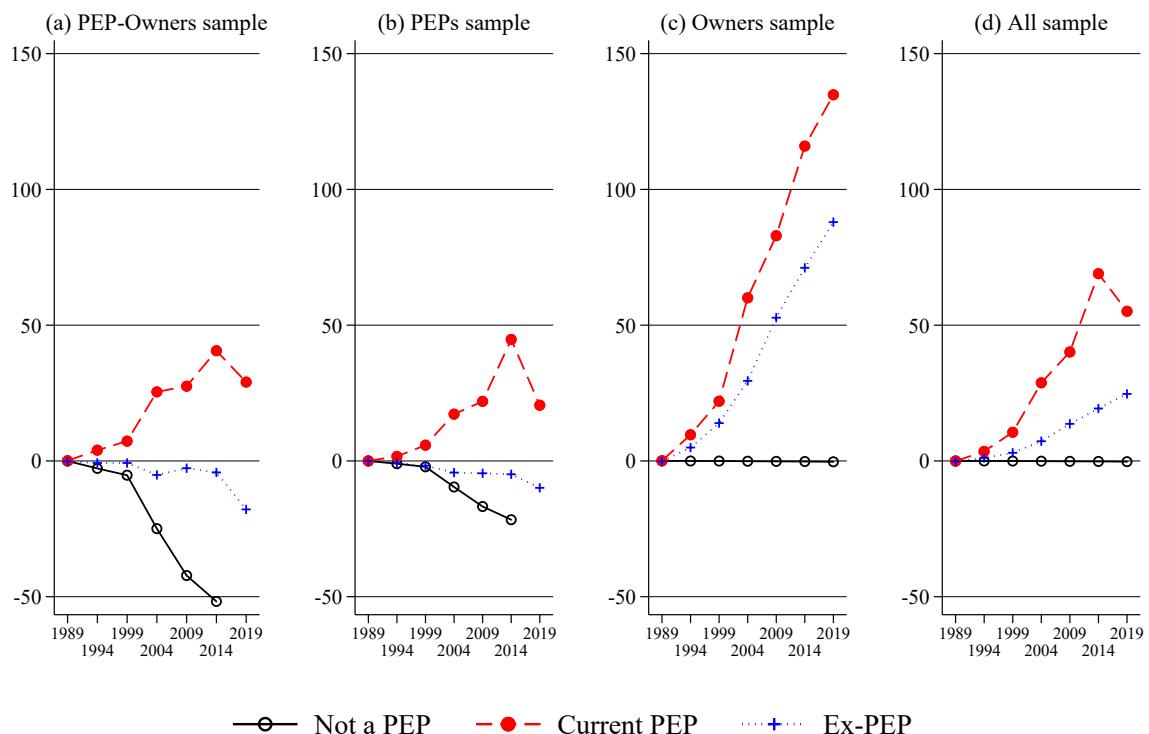


Figure 1.B.6: Comparison of outcomes over time, across different PEP categories using alternative samples (contd.)

(vii) *Godfather centrality*:

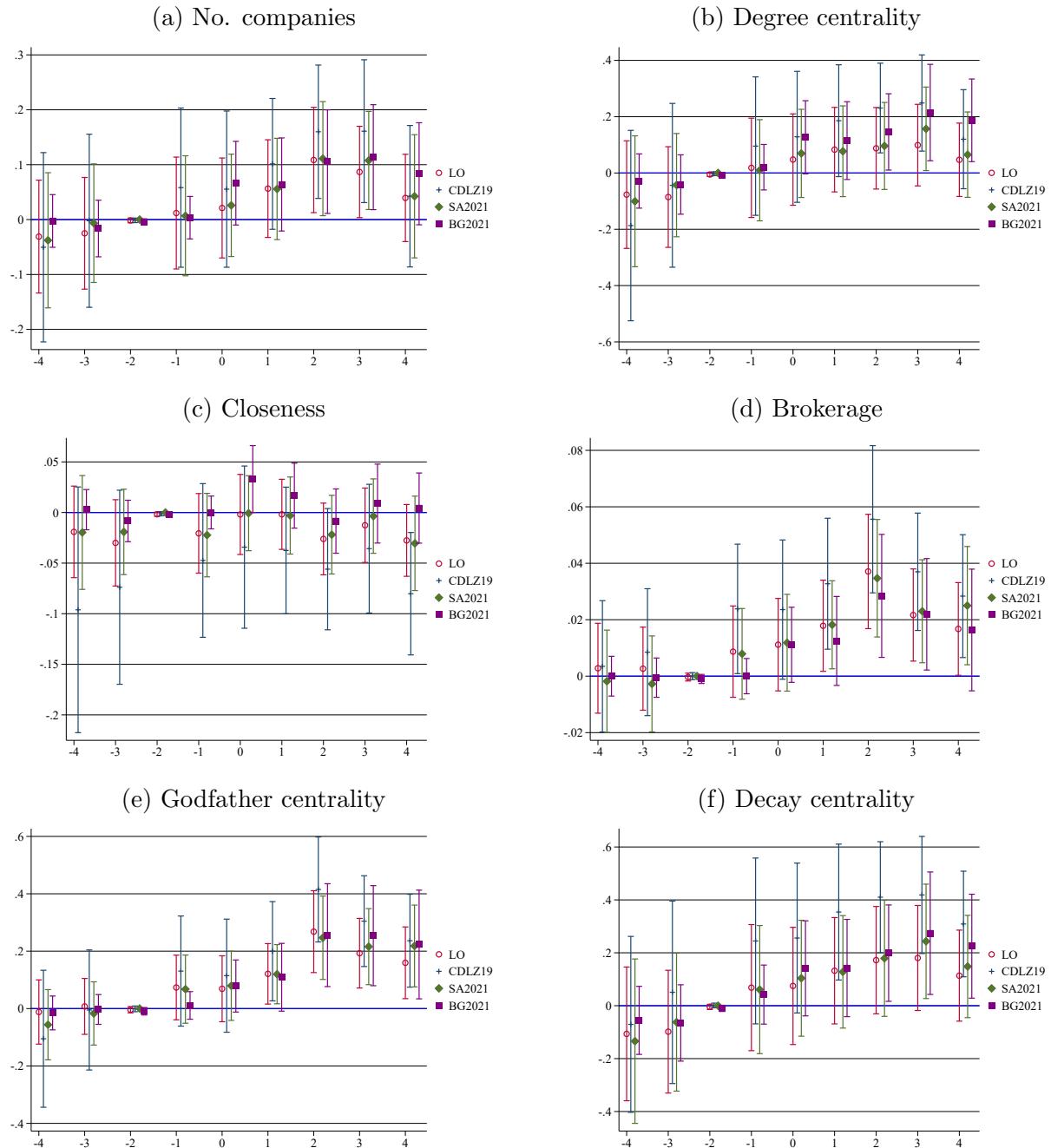


(viii) *Decay centrality*:



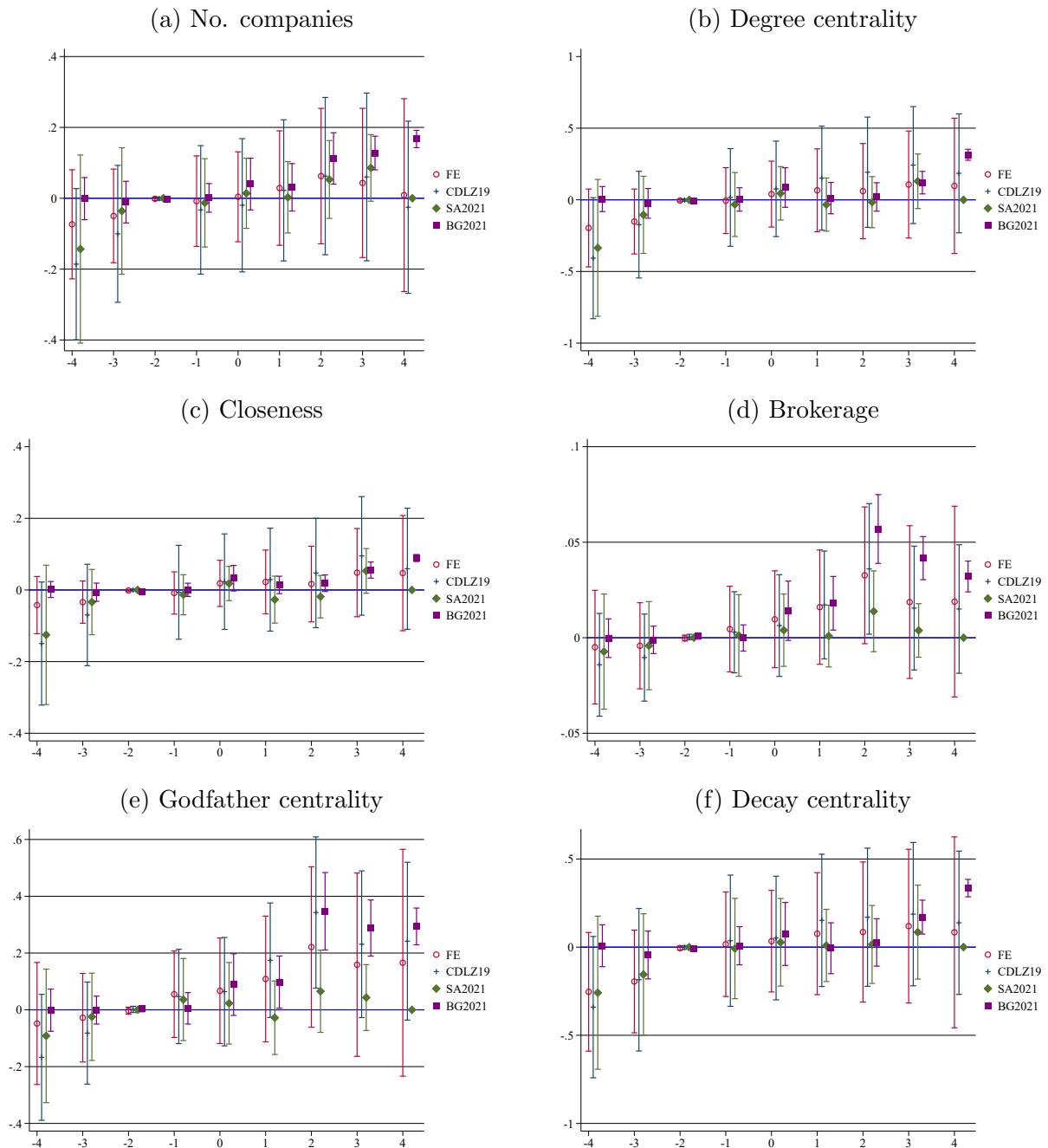
Note: as per Figure 1.3 in the text, each figure compares outcome means by period for groups defined by PEP status; panels (i)-(viii) refer to distinct outcomes; column-wise sub-figures (a)-(d) indicate the analytical sample; all outcomes are adjusted for period fixed-effects.

Figure 1.B.7: Event study analysis for PEPs based on LO specification, alternative outcomes



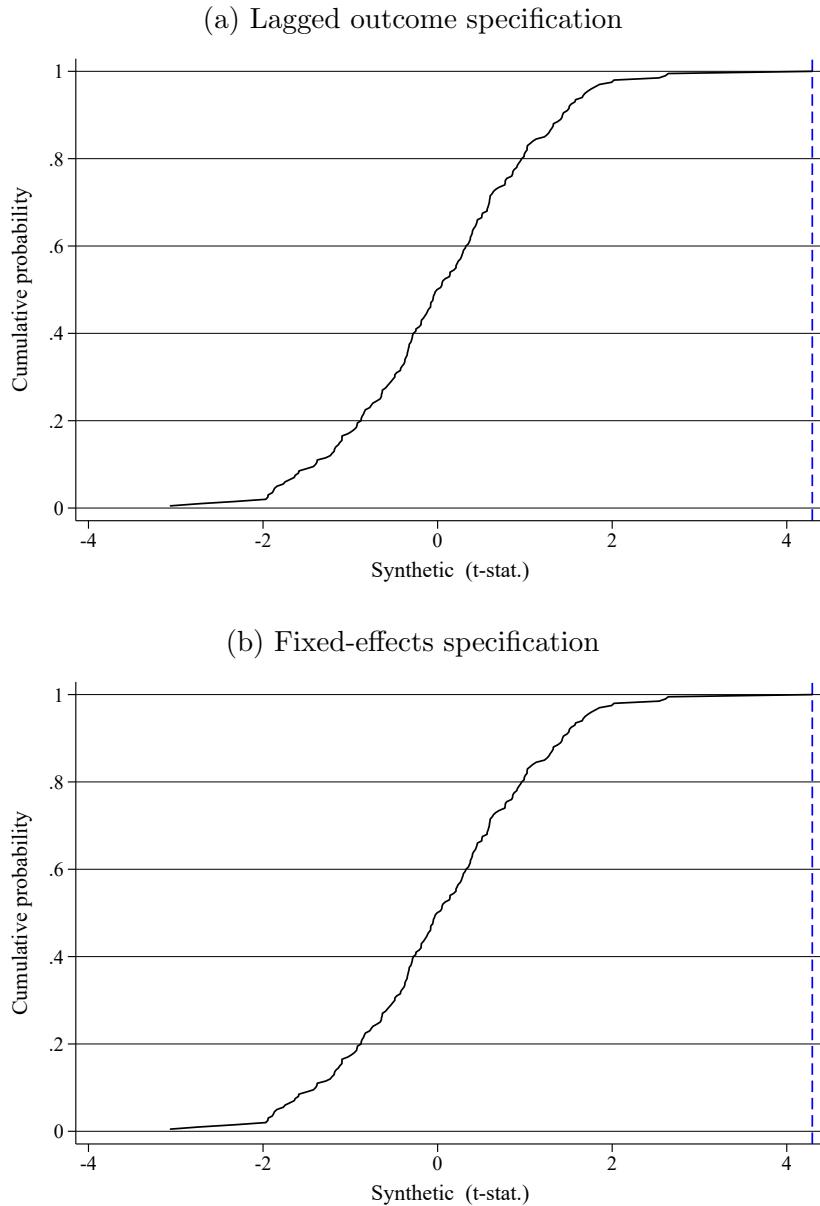
Note: each panel plots the event study coefficients and 95% confidence intervals for being a PEP for different outcomes, using the full LO specification; $t = 0$ denotes the period in which individuals first become a PEP; the set of event time dummy variables is normalized to equal zero at $t = -2$; see also Figure 1.5(a) in the text.

Figure 1.B.8: Event study analysis for PEPs based on FE specification, various outcomes



Note: each panel plots the event study coefficients and 95% confidence intervals for being a PEP for different outcomes, using the full FE specification; $t = 0$ denotes the period in which individuals first become a PEP; the set of event time dummy variables is normalized to equal zero at $t = -2$; see also Figure 1.5(b) in the text.

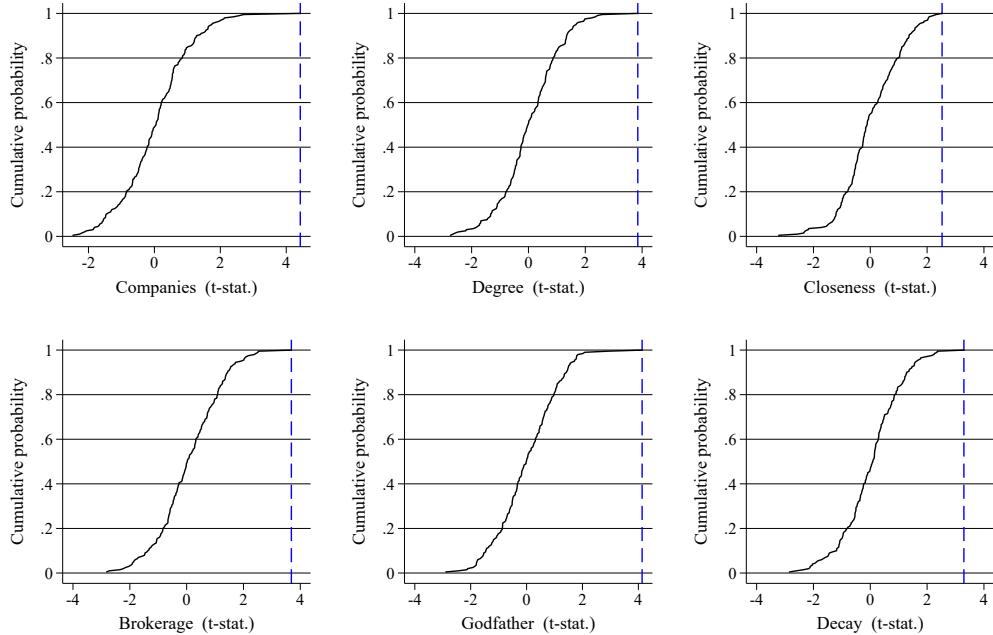
Figure 1.B.9: Placebo analysis for being a current PEP on synthetic business network capital



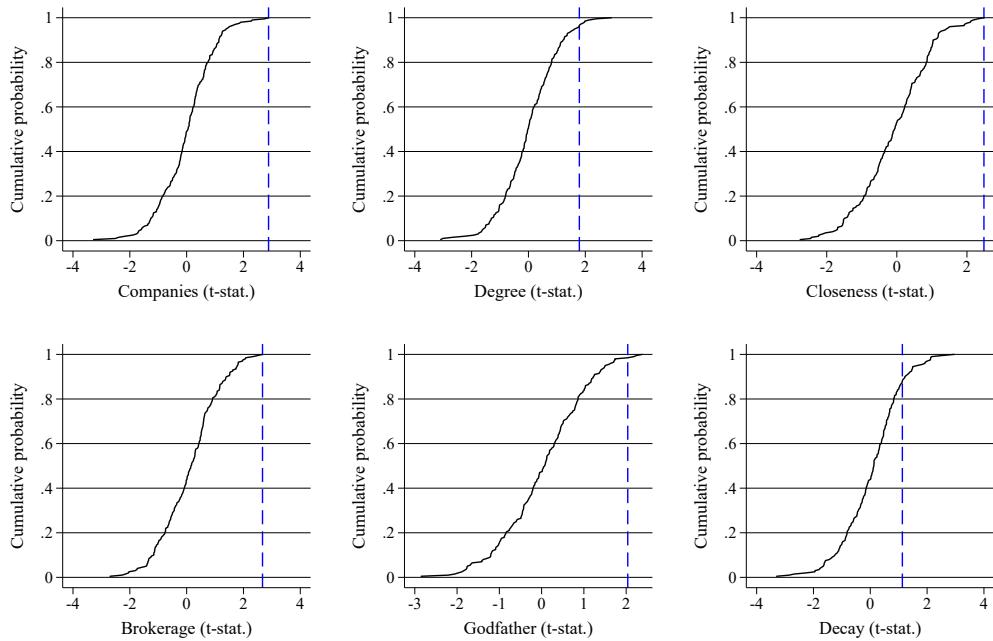
Note: figures plot the cumulative distributions of t-statistics associated with estimates for the dummy variable for being a PEP using different specifications (in the panels) for the synthetic outcome, based on a placebo permutation approach as described in the text; blue dotted lines indicate t-statistics obtained from regressions run with the observed data.

Figure 1.B.10: Placebo analysis for being a current PEP on various outcomes

(a) Lagged outcome specification



(b) Fixed-effects specification



Note: figures plot the cumulative distributions of t-statistics associated with estimates for the dummy variable for being a PEP using different specifications (in the panels) for alternative outcomes (x-axes), based on a placebo permutation approach as described in the text; blue dotted lines indicate t-statistics obtained from regressions run with the observed data.

1.C Relationship between lagged outcome and fixed effects estimators

In order to demonstrate, in a simplified setting, the bracketing relationship between the fixed effects (FE) and lagged outcome (LO) estimators, presume the following true data generating process:

$$y_{it} = \lambda\alpha_i + \theta y_{i,t-1} + \beta P_{it} + \varepsilon_{it} \quad (1.5)$$

where P is the treatment variable of interest (PEP), all variables are mean zero (permitting us to ignore constant terms), $\lambda \geq 0$, and we assume $\varepsilon_{it} \perp P_{it} \mid \alpha_i, y_{t-1}$, allowing for selection into treatment based on either unit fixed effects or past outcomes. We further assume a simple two period setting in which some units receive the treatment only in period t , implying: $P_{i,t-1} = 0 \Leftrightarrow y_{i,t-1} = \lambda\alpha_i + \varepsilon_{i,t-1}$.

Fixed effects estimator

Here, the analyst proposes to analyse the data using the following empirical model:

$$y_{it} = \lambda\alpha_i + \beta P_{it} + \varepsilon_{it} \quad (1.6)$$

Taking first differences to sweep out the fixed effects, and assuming no serial correlation in the error terms, the resulting estimate for β will be:

$$\hat{\beta}_{FE} \xrightarrow{p} \beta + \frac{E([\lambda\alpha_i + (\theta - 1)y_{i,t-1} + \varepsilon_{it}] \cdot P_{it})}{E(P_{it}^2)} \quad (1.7)$$

$$= \beta + \lambda\theta \frac{E(\alpha_i P_{it})}{E(P_{it}^2)} + (\theta - 1) \frac{E(\varepsilon_{i,t-1} P_{it})}{E(P_{it}^2)} \quad (1.8)$$

Lagged outcome estimator

Here, the analyst proposes to analyse the data using the following empirical model:

$$y_{it} = \theta y_{i,t-1} + \beta P_{it} + \varepsilon_{it} \quad (1.9)$$

To do so, she first partitions the treatment variable into a component correlated with the lagged outcome and an orthogonal residual:

$$P_{it} = \hat{\phi}y_{i,t-1} + \tilde{P}_{it} \quad (1.10)$$

where $\hat{\phi} = E(P_{it}y_{i,t-1})/E(y_{i,t-1}^2)$. Focussing then on the simplified (covariance-adjusted) model of interest, $y_{it} = \beta\tilde{P}_{it} + \varepsilon_{it}$, yields the following estimator:

$$\hat{\beta}_{LO} \xrightarrow{prob.} \beta + \frac{E([\lambda\alpha_i + \theta y_{i,t-1} + \varepsilon_{it}] \cdot \tilde{P}_{it})}{E(\tilde{P}_{it}^2)} \quad (1.11a)$$

$$= \beta + \lambda \frac{E(\alpha_i \tilde{P}_{it})}{E(\tilde{P}_{it}^2)} \quad (1.11b)$$

$$= \beta + \lambda \frac{E(\alpha_i \cdot [P_{it} - \hat{\phi}y_{i,t-1}])}{E(\tilde{P}_{it}^2)} \quad (1.11c)$$

$$= \beta + \lambda \frac{E(\alpha_i \cdot [P_{it} - \hat{\phi}(\lambda\alpha_i + \varepsilon_{i,t-1})])}{E(\tilde{P}_{it}^2)} \quad (1.11d)$$

$$= \beta + \lambda \left(\frac{E(\alpha_i P_{it})}{E(\tilde{P}_{it}^2)} - \frac{E(\alpha_i^2)}{E(\tilde{P}_{it}^2)} \frac{E(P_{it}[\lambda\alpha_i + \varepsilon_{i,t-1}])}{E(\alpha_i^2) + E(\varepsilon_{i,t-1}^2)} \right) \quad (1.11e)$$

$$= \beta + \lambda \frac{E(\alpha_i P_{it})}{E(\tilde{P}_{it}^2)} [1 - \lambda k] - \lambda k \frac{E(P_{it}\varepsilon_{i,t-1})}{E(\tilde{P}_{it}^2)} \quad (1.11f)$$

$$= \beta + \lambda \frac{E(\alpha_i P_{it})}{E(\tilde{P}_{it}^2)} \underbrace{\left[1 - k \left(\lambda + \frac{E(P_{it}\varepsilon_{i,t-1})}{E(\alpha_i P_{it})} \right) \right]}_{\text{Adjustment factor}} \quad (1.11g)$$

where $k = E(\alpha_i^2)/[E(\alpha_i^2) + E(\varepsilon_{i,t-1}^2)] \leq 1$.

Implications

The following two cases set out the primary implications of this exercise:

Case 1: Consider the special case of equation (1.5) where selection into treatment occurs positively and uniquely on the unit fixed effects. This implies: $\theta = 0$ or $E(\varepsilon_{i,t-1}P_{it}) = 0$, and $E(\alpha_i P_{it}) > 0$. In turn, this implies $\hat{\beta}_{LO} > \beta = \hat{\beta}_{FE}$.

Case 2: Consider the opposite case where selection into treatment occurs positively and uniquely on the lagged error term. Now we have: $\lambda = 0$ or $E(\alpha_i P_{it}) = 0$, and

$E(\varepsilon_{i,t-1} P_{it}) > 0$. For $\theta < 1$, this implies $\hat{\beta}_{FE} < \beta = \hat{\beta}_{LO}$.

Cases 1 and 2 demonstrate the bounding properties of the two estimators – i.e., $\hat{\beta}_{LO} \geq \beta \geq \hat{\beta}_{FE}$. Beyond these limit cases, we would generally expect the bounds to be tighter:

Case 3.1: In intermediate cases, where there is some combination of both forms of selection, the magnitude of bias given in each of the latter two cases would typically be smaller – the downward bias for the FE estimator is offset by the second term in equation (1.8) with coefficient $\lambda\theta$; and the upward bias in the LO estimator would be offset by the adjustment factor in equation (1.11g).

Case 3.2: In the special case that the lagged outcome is highly persistent ($\theta \approx 1$) and $\lambda > 0$, then both estimators are likely to be upward biased by similar magnitudes. However, here we would now expect $\hat{\beta}_{FE} > \hat{\beta}_{LO}$. Thus, the ordering of the two estimates provides an important indication of the properties of the data.

1.D Data sources, cleaning and flowchart Python code

PEP references

The FRELIMO Central Committee (CC) and Polit Bureau (PB) members for each Congress were identified with the following documents:

- 1st CC : FRELIMO (1962). Documents from the 1st Congress, Dar Es Salaam, 23-28 September 1962. Mozambique Liberation Documents Collection. Available at: www.aluka.org
- 2nd CC: FRELIMO (1968). Voting results of the 2nd Congress, Dar Es Salaam, 20-25 July 1968. Arquivo Nacional da Torre do Tombo. Available at: digitarq.arquivos.pt/
- 3rd CC: Notícias (1977). Voting results of the 3rd Congress , 3-7 February 1977. Sociedade do Notícias SA Archive, not available online
- 4th CC: Notícias (1983). Article about the 4th FRELIMO Congress. Maputo 27 April 1983. Sociedade do Notícias SA Archive, not available online
- 5th CC: Notícias (1989). Documents from the 5th Congress, 1989, Sociedade do Notícias SA Archive, not available online
- 6th CC: FRELIMO (1991). Voting results from the 6th Congress, 1991, Personal archive of Colin Darch, not available online
- 7th CC: Walle, Nicolas & Villalón, Leonardo (2006). The Fate of Africa's Democratic Experiments: Elites and Institutions, p 244. Indiana University Press.
- 8th CC: Jaime Cuambe (2002). O novo Comité Central. 17 June 2002. Sociedade do Notícias SA Archive, not available online
- 9th CC: Jaime Cuambe (2006). Dirigente deve servir não servir-se do povo. Quelima, 11-15 November 2006. Sociedade do Notícias SA Archive, not available online

- 10th CC: Hanlon (2012). New Political Commission. Pemba, 2012. MOZAMBIQUE News reports & clippings 202. Available at: tinyurl.com/mozamb
- 11th CC: Hanlon (2017) Nyusi wins control of Political Commission. 2 October 2017. MOZAMBIQUE News reports & clippings 386. Available at: www.open.ac.uk/technology/mozambique/news-reports-2017

Minister mandates 1990-2019:

- The Statesman's Year-Book series. Published 1864 - 2020. Springer Nature. Available at: link-springer-com.ep.fjernadgang.kb.dk/bookseries/15683

Vice-minister mandates:

- João M. Cabrita(2000). Mozambique The Tortuous Road to Democracy. 2000. Palgrave Macmillan
- Joseph Hanlon and Racel Waterhouse (1995:10). Mozambique peace process bulletin Issue 14. February 1995. AWEPA European Parliamentarians for Southern Africa. Available at: www.open.ac.uk/technology/mozambique/political-process-1993-2008
- AIM(2005).President Guebuza appoints his government. 16th February 2005. Mozambique News Agency AIM Reports No.293. Available at: www.poptel.org.uk/mozambique-news/newsletter/aim293.html
- Joseph Hanlon(1984:300). Mozambique: The Revolution Under Fire. 1 Dezember 1984. Zed Books Ltd.
- Irving Kaplan (1977: 175). Area handbook for Mozambique. January 1, 1977. University of Michigan Library.
- Mozambique Embassy to the USA (2008). Armando Alexandre Panguene. 9th Jul 2008. AllAfrica Global Media. Available at: myafrica.allafrica.com/view/people/main/id/07SDoPbUCoymygpb.html
- John Paxton (1987:874). Mozambique. 1987. The Staesman's Year-Book 1987-1988.

- John Paxton (1989:884). Mozambique. 1989. The Staesman´s Year-Book 1989-1990.
- Mozvest(2019). Tomaz Augusto Salomão. 2019. Retrieved from: mozvest.com/speakers/tomaz-augusto-salomao/

Registry data

Figure 1.D.1: Sample excerpt from the BR3

12	III SÉRIE — NÚMERO 1
<p>meticais, correspondente à uma quota única, pertencente ao sócio Issufo Azize Sousa Abdula, representativa de 100% do capital social.</p> <p>ARTIGO QUINTO (Administração e gerência)</p> <p>Um) A administração e gerência da sociedade bem como a sua representação em juízo e fora dele, activa ou passivamente, será exercida pelo sócio Issufo Azize Sousa Abdula, que desde já fica nomeado administrador único, com dispensa de caução com ou sem remuneração.</p> <p>Dois) A sociedade obriga-se:</p> <ul style="list-style-type: none"> a) Pela assinatura do administrador único; b) Pela assinatura de procuradores nomeados dentro dos limites dos poderes das respectivas procurações. <p>ARTIGO SEXTO (Balanço)</p> <p>Um) Os exercícios sociais coincidem com os anos civis.</p> <p>Dois) O balanço e contas fechar-se-ão em trinta e um de Dezembro de cada ano e serão submetidos à apreciação pelo sócio único.</p> <p>ARTIGO SÉTIMO (Disposições finais)</p> <p>Um) Em caso de morte, a sociedade continuará com os herdeiros ou representante do falecido ou interdito, o qual nomeará um que a todos represente na sociedade, enquanto a quota permanecer indivisa.</p> <p>Dois) A sociedade só se dissolve nos casos fixados por lei, caso a sua dissolução tenha sido decidida por acordo, será liquidada como o sócio único decidir.</p> <p>Três) Os casos omissos serão regulados pelas disposições da lei.</p> <p>Maputo, 21 de Dezembro de 2018. — O Técnico, <i>legível</i>.</p> <p>Agricultural And Ecological Systems International, Limitada</p> <p>Certifico, para efeitos de publicação, que por acta de catorze de Dezembro de dois mil e dezotto, da sociedade Agricultural And Ecological Systems International, Limitada, AgrEcol SI, matriculada sob NUEL 100016605 deliberaram a cessão da quota no valor de vinte mil meticais que o sócio Cecílio Bila, possuía no capital social da referida sociedade e que cedeu a Giancarlo Monteforte.</p>	<p>Em consequência, é alterada a redacção do artigo quarto dos estatutos que passa a ter a seguinte nova redacção:</p> <p>ARTIGO QUARTO (Capital social)</p> <p>O capital social integralmente subscrito em dinheiro, é de quarenta mil meticais, correspondente a soma de duas quotas iguais de vinte mil meticais cada uma, pertencente uma a cada sócio Demitrio Alberto Macaringue e Giancarlo Monteforte.</p> <p>Maputo, 17 de Dezembro de 2018. — O Técnico, <i>legível</i>.</p> <p>Mobiliás Masr, Limitada</p> <p>ADENDA</p> <p>Por ter saído inexacto publicado no <i>Boletim da República</i>, n.º 238, III série, de 6 de Dezembro, a sociedade acima retifica o contrato:</p> <p>Onde se lê: «Soliman Arafa Mohamed Aboubakar, casado, natural de Kafreshikh, residente em Maputo, que constituem entre si uma sociedade por quotas de responsabilidade limitada que se regerá pelas cláusulas constantes nos artigos seguintes...», deve se ler: «Osama Arafa Mohamed Aboubakar, casado, natural de Kafrelshikh, residente em Maputo e Soliman Arafa Mohamed Aboubakar, casado, natural de Kafreshikh, residente em Maputo, que constituem entre si uma sociedade por quotas de responsabilidade limitada que se regerá pelas cláusulas constantes nos seguintes»</p> <p>O Técnico, <i>legível</i>.</p> <p>Sanana School In Maputo, Limitada</p> <p>Certifico, para efeitos de publicação, que por escritura pública de vinte e um de Setembro de dois mil e dezotto, lavrada de folhas octenta e oito a folhas noventa e um do livro de notas para escrituras diversas número quinhentos e oito, traço A, desde Cartório Notarial de Maputo, perante Sérgio Custódio Miambó, conservador e notário superior dos registos e notariado, em exercício no referido cartório, procedeu-se na sociedade em epígrafe, a divisão, cessão, unificação de quotas e alteração parcial do pacto social em que a sócia Fátima Mahomed Jumá divide a sua quota, com o valor nominal de dois mil e quinhentos meticais, correspondentes a vinte e cinco por cento do capital social, em duas quotas distintas, sendo uma no valor nominal de dois mil meticais, correspondente a vinte por cento do capital social e outra quota</p> <p>no valor nominal de quinhentos meticais, correspondente a cinco por cento do capital social.</p> <p>Que a sócia Fátima Mahomed Jany Jumá cede a sua quota no valor nominal de quinhentos meticais, correspondente a cinco por cento do capital social, ao preço de seis milhões e quinhentos mil meticais, a favor da sócia Claida Faquir Sulemane Aboobakar, reservando para si a quota no valor nominal de dois mil meticais, correspondentes a vinte por cento do capital social.</p> <p>Que, a sócia Fátima Mahomed Jany Jumá, aparta-se da quota cedida, nada tendo a haver dela.</p> <p>Que, em consequência da divisão e aquisição da quota no valor nominal de quinhentos Meticais, correspondente a cinco por cento do capital social, a sócia Claida Faquir Sulemane Aboobakar, unifica a quota adquirida à quota primitiva por si detida, no valor de dois mil e quinhentos meticais, correspondente a vinte e cinco por cento do capital social, passando a deter uma quota única no valor nominal de três mil meticais, correspondente a trinta por cento do capital social, alterando-se assim o artigo quarto dos estatutos da sociedade, que passa a ter a seguinte nova redacção:</p> <p>ARTIGO QUARTO</p> <p>O capital social é de dez mil de meticais, integralmente subscrito e realizado em dinheiro que corresponde à soma de quatro quotas assim distribuídas:</p> <ul style="list-style-type: none"> a) Uma quota no valor nominal de dois mil e quinhentos meticais, correspondente a vinte e cinco por cento do capital social, subscrita pelo sócio Carlos Alfredo de Aguiar Loforte; b) Uma quota no valor nominal de três mil meticais, correspondente a trinta por cento do capital social, subscrita pela sócia Claida Faquir Sulemane Aboobakar; c) Uma quota no valor nominal de dois mil meticais, correspondente a vinte por cento do capital social, subscrita pela sócia Fátima Mahomed Jany Jumá; e d) Uma quota no valor nominal de dois mil e quinhentos meticais, correspondente a vinte e cinco por cento do capital social, subscrita pelo sócio Luís Augusto de Aguiar Loforte. <p>Que em tudo o mais não alterado continuam a vigorar as disposições do pacto social anterior.</p> <p>Maputo, dezassete de Dezembro de dois mil e dezotto, <i>legível</i>.</p>

Name cleaning

To account for inconsistencies in name spellings we apply a two fold strategy. First we encode all strings into lowercase ASCII characters using the Python package *unidecode* (pypi.org/project/Unidecode/). Next, we apply fuzzy string matching to identified identical names that are spelled slightly different. We implement this step with the package *difflib* (docs.python.org/3/library/difflib.html) which uses the Levenshtein dis-

Table 1.D.1: Matching rate threshold

Name in the bulletin	Threshold for Levenshtein distance
Aires Bonifácio Baptista Ali	100 %
Aires Binifacio Baptista Ali	92 %
Aires Bonifacio Batista Aly	90 %
Ayres Bonifacio Baptista Aly	89 %
Aires Bonifacio Baptista AliJunior	87%
Aires Bonifacio Ali	76%
Luisa da Conceicao Baptista Ali	71 %
Bonomar Baptista Alifa	68%

tance between strings. This approach improves the consistency of our sample significant, nevertheless it is not a panacea. *Difflib* requires a threshold to identify matching strings, the "right" threshold to identify plausible matches differs across names, as Table 1.D.1 illustrates. While all matches until 71% are plausible matches in this examples, are matches below 70 % at the most family members or individuals with the same name. Our main empirical analysis define a threshold of 92.5 % as a match, as robustness checks we also define 90% and 95% thresholds.

Outcome variables

Table 1.D.2: Correlation between outcome variables

	Companies	Decay	Degree	Godfather index
Companies	1.000000	0.408750	0.374471	0.468743
Decay	0.408750	1.000000	0.607449	0.473603
Degree	0.374471	0.607449	1.000000	0.451502
Godfather index	0.468743	0.473603	0.451502	1.000000

Keywords by industry

To allocate firms to specific industries, we use the following keywords:

Table 1.D.3: Keywords used to identify main company sectors

Finance	Health/Education	Mining	Trading
financeiro	farmacia	minerais	import
investimento	hospital	minas	export
participacao	medica	mineiro	importacao
participacoes	optica	drilling	exp
banco	cosmeticos	mining	imp
financas	health	minerals	trading
seguro	educacao	coal	exportadora
aluguer	beleza	mining	exportacao
investiment	social	metais	
holding	crianca	mineracao	
invest	dental		
capital	school		
banking	instituto		

Note: to match companies to sectors we removed diacritical marks in the text; matching was applied to each company's stated social objectives, where available.

Documentation of Python code

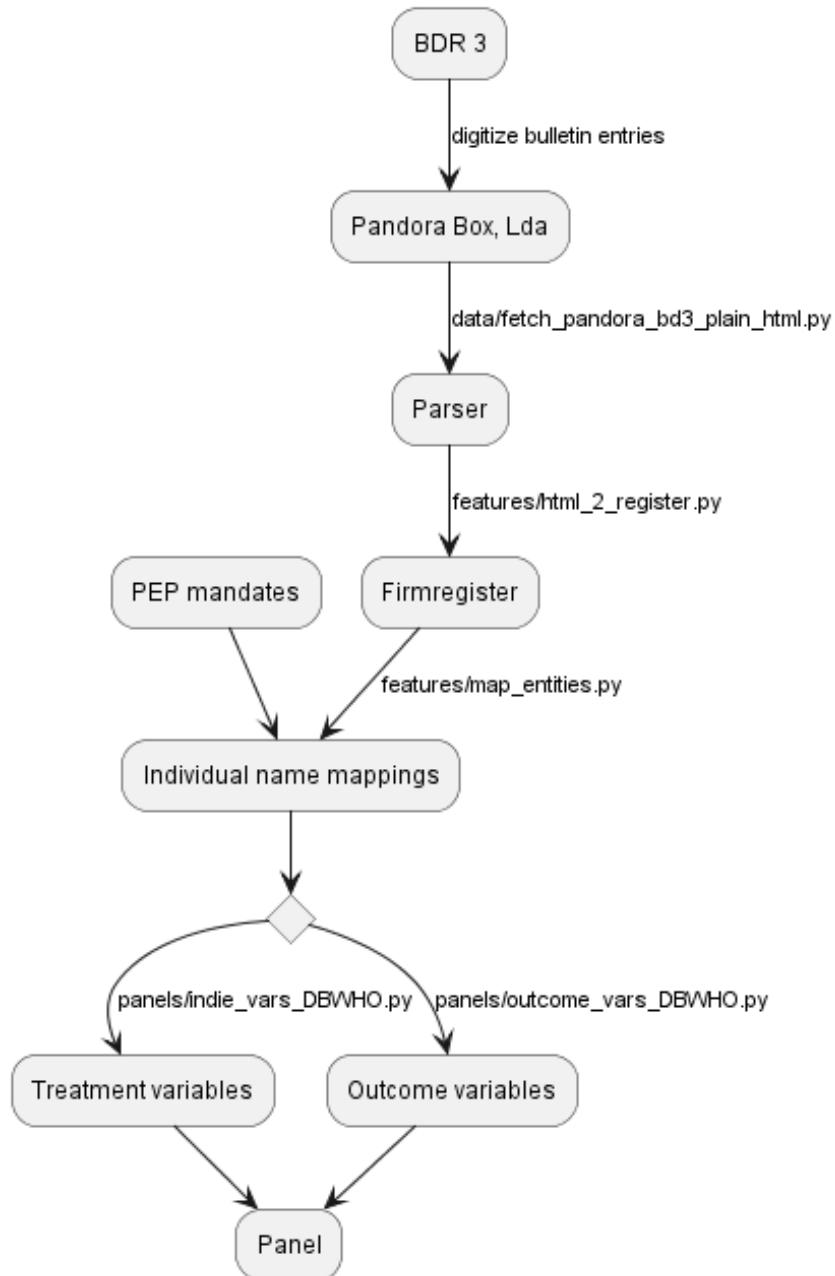
The Python code consists of four main modules that are executed subsequently. Each uses external- and submodules. Flowchart 1.D.2 visualizes the process. First, *parser_main* downloads all entries in the pandora database and stores each entry as a single row in a csv file. To get access to the Pandora database, a subscription is needed. Next, *compREG_main* sets up a consistent company register, listing unique firms and their characteristics. This step includes the name cleaning of business owners. Duplicate names are identified in the module *name_mapper* using the Levenshtein distance (see Section 1.D). This step requires the extensive computing power. Each name-duplicate using a receptive Levenshtein threshold is therefore stored locally. The industries in which firms operate are identified by keywords (see Section 1.D).

The cleaned company register is now reshaped into an owner register in *ownerREG_main*, listing all firm affiliations for each business owner. This module also creates undirected networks of business owners in five year periods, starting in 1985.

These network graphs are used in *centralities_main*, to calculate centralities of this network. Degree-, betweenness and closeness centralities are calculated using the inbuilt modules of the python package *networkx*. Jackson's (2019) Godfather and decay centralities are calculated in modules written by the author.

Finally, the panel for our main analysis is merged in *owner_panel_main.py*. It includes company characteristics from the owner register and network centralities. Additionally, we parse a list of Mozambican company lawyers and map them with the same Levenshtein distance threshold that is used in the *name_mapper* on the panel. This threshold is also used to map names of PEPs from our PEP database on the panel. We export this panel as a .dta file and analyze it in STATA.

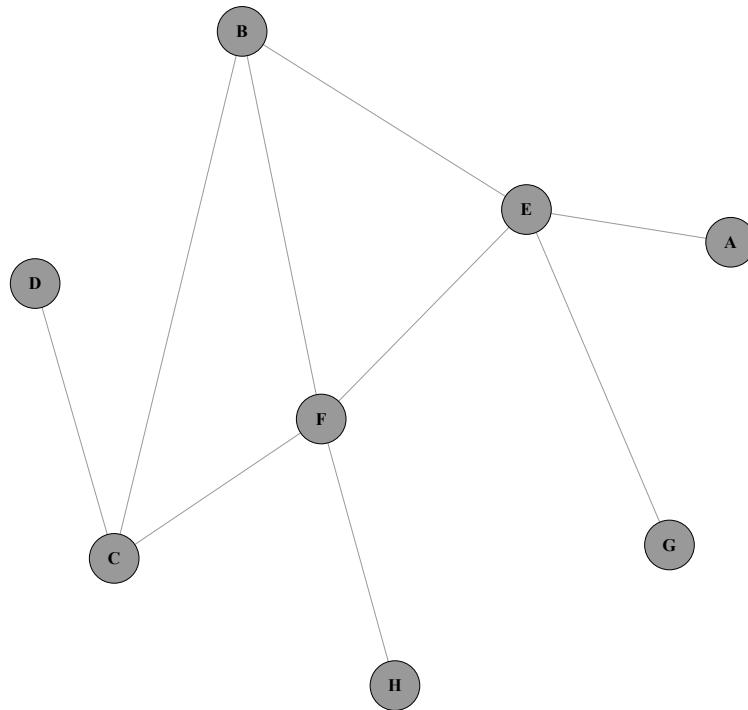
Figure 1.D.2: Flow-diagram of main python modules



1.E Example of network metrics

As an example of how three key measures of network position capture different insights, Figure 1.E.1 shows a simplified network. The associated table lists the corresponding centrality metrics for each node. Notably, nodes E and F have the same degree centrality but differ both in the Godfather Index and Decay centrality. Correspondingly, no unambiguous most central node exists within the network – i.e., different metrics capture different aspects of influence within the network.

Figure 1.E.1: Graph of a simple business network



Node	Degree centrality	Godfather Index	Decay centrality
A	0.143	0	1.500
B	0.429	1	2.500
C	0.429	2	2.250
D	0.143	0	1.250
E	0.571	5	2.625
F	0.571	4	2.750
G	0.143	0	1.500
H	0.143	0	1.625

Note: authors' elaboration.

Note: cells report the centrality measures for each node in the above graph.

Chapter 2

Authoritarian Political Selection: Ruling Parties and the Rise of Business Elites

FELIX SCHILLING, COPENHAGEN BUSINESS SCHOOL

BENJAMIN C.K. EGEROD, COPENHAGEN BUSINESS SCHOOL

ANNE SPENCER JAMISON, COPENHAGEN BUSINESS SCHOOL

MOGENS K. JUSTESEN, COPENHAGEN BUSINESS SCHOOL

2.1 Introduction

Ruling elites in authoritarian regimes rely on a variety of strategies and institutional mechanisms to bolster their grip on political power. A large literature demonstrates that authoritarian regimes use various co-optation strategies to neutralize threats to their political survival. For instance, authoritarian regimes use mass elections, political parties, and parliamentary representation to distribute rents and resources with the aim of co-opting existing elites (Blaydes 2008), the mass public (Gandhi 2008), opposition groups (Gandhi and Lust-Okar 2009), or elite factions within the ruling party (Boix and Svolik 2013). Institutionalization of authoritarian politics may, in turn, increase regime stability

(Knutsen, Nygård, et al. 2017; Meng 2020).

Yet, we know little about selection into positions of political power in authoritarian regimes. While much work has been devoted to the structure and content of political institutions, an equally important set of questions—which have been given far less attention—concern who governs and holds positions of power in authoritarian regimes, and how and why they are recruited—or select—into politics. In particular, we know little about the extent to which economic and business elites—sometimes viewed as a potential threat to incumbent political elites—are recruited into politics by ruling parties in authoritarian regimes. In this paper, we argue and show empirically that ruling party elites—against the backdrop of positive economic shocks to the economy—construct and co-opt emerging business elites into positions of firm ownership and political office. We advance this argument by developing a theory of vertical political integration in authoritarian polities. Our theory highlights how actively shaping selection into firm ownership and using the pool of new firm owners as a basis for recruitment into political office allows ruling parties to respond to two fundamental problems of authoritarian politics: A dual information problem and a dual commitment problem.

The *dual information problem* arises because authoritarian governments notoriously face problems of information asymmetries (Geddes et al. 2018; Wintrobe 2009). This works to the disadvantage of ruling party elites by making it hard to obtain credible information as input for political decision-making. Bringing business elites into government alleviates some of the informational asymmetries because business elites possess knowledge and expertise about markets and industries that are important for the ruling regime. At the same time, the ruling party can better monitor the actions and political loyalty of potentially powerful business elites who are integrated into the organization and institutions of the authoritarian state. Similarly, for business elites, a seat in a political office is a valuable channel of information that reduces policy uncertainty and provides a venue for directly shaping the rules and regulations that govern their industries and firms.

The *dual commitment problem* arises because political elites in authoritarian regimes cannot credibly commit to refrain from expropriating investment or making sudden changes

to the regulatory framework that governs business (Justesen 2015; Weingast 1995). Similarly, the rise of a new business elite constitutes a potential threat to the ruling regime, because new business elites cannot credibly commit to providing loyalty and support for the regime. Authoritarian regimes may respond to this commitment problem by steering the recruitment of business owners into political office. Constructing and distributing jobs to business elites in the political organization of an authoritarian state gives the ruling party—and its inner circle—a stake in the survival and rent-extraction of firms. At the same time, the new class of business elites has a stake in the survival of the regime.

This organizational response of the ruling party—shaped by the information and commitment problems—constitutes a form of vertical political integration, where firm owners are integrated into the organizational hierarchy of the authoritarian party-state. Vertical political integration serves as a strategy to calibrate the incentives of the existing political elite and business elites. This alleviates informational asymmetries facing the regime and makes business elites credible agents of regime stability. We expand upon this theory by pointing to two mechanisms that amplify—or attenuate—the effectiveness of vertical political integration of business elites: first, vertical political integration is more effective as a political strategy if the ruling party allocates property rights to firms and assets as a form of predistributive politics aimed at controlling selection into firm ownership. By constructing and distributing business licenses and firm ownership, the ruling party can actively shape the composition of new firm owners and then use the pool of new firm owners as a basis for recruitment of business elites into political office. Second, this strategy is likely to work better if it is applied to members of the social network of incumbent party elites. Since authoritarian rulers and political elites are generally fearful that coups lead to a sudden demise of their reign (Haber 2008; Meng 2020; Svolik 2012; Wintrobe 1998), they may prefer to deal with people who are closer in their social network—and who they estimate they can have more confidence in. Constructing a new business elite and integrating it into the political organization of the ruling party may therefore be a more effective strategy if ruling party elites grant firm ownership—and seats in political office—to socially proximate people in their networks.

Prior work emphasizes that (positive) economic shocks, as well as a sudden inflow of new technologies and resources, potentially disrupt the power of existing political elites (Acemoglu and James A Robinson 2006). Our argument, in contrast, emphasizes that authoritarian regimes can respond to economic disruptions caused, for instance, by natural resource windfalls, by endogenously constructing new business elites in a rapidly evolving private sector and integrating them into existing political power structures.

Empirically, we study the recruitment of new business owners to political office using evidence from an electoral autocracy—Mozambique—that is governed by a dominant party that diligently controls entry into all levels of political office. Mozambique is an ideal case for our purposes since the 2009 discovery of gas can be leveraged as a natural experiment that created a shock to the formalized private sector and, seemingly, altered the nature and composition of the country’s private sector firms and business elites. Indeed, the discovery of large deposits of gas caused a sudden inflow of foreign direct investment. This, in turn, spurred massive growth in the number of formal and privately owned firms with links to the natural resource industry.

The study of Mozambique is complicated by the lack of readily available data on firms and their owners. To address this challenge, we scrape unstructured text data on firm ownership from a national gazette containing all formally registered entries since Mozambique’s independence. In this way, we collect novel data on the universe of post-independence business owners in Mozambique and match it with the names of people serving in political office. Using a difference-in-differences design with a staggered roll-out, and a synthetic control model leveraging the sudden inflow of FDI to the natural resource industry, we present comprehensive evidence supporting our argument. First, we show that when a member of the business elite founds a company that works with gas extraction, they experience a marked increase in their likelihood of getting recruited into political office. Second, our theory implies that the ruling party also constructs entry into firm ownership and, in particular, that central members of ruling party politicians’ social networks are disproportionately recruited into firm ownership and political office. Since family members are arguably the most central part of the social network of politicians

(Cruz et al. 2017), an implication of this argument is that dynastic ties condition the way vertical political integration in the ruling party operates in practice. Consistent with this idea, we show that the inflow of FDI spurred a large increase in gas companies owned by family members of the ruling party. Beyond what we expect based on our theory, however, our findings also show that incumbent politicians as well as their existing business partners—the old political and economic elites—experienced a large drop in ownership of firms adjacent to the gas industry.

Taken together, these findings suggest that the incumbent political elite reacted to the growth shock to the economy by installing proximate members of their social network as firm owners in the gas industry - even if the old elite did not directly benefit from rent extraction themselves. Positions as firm owners were then used as a springboard to enter political office. Installing people with close social ties as firm owners in the new gas industry was likely a strategy to avoid the exogenous emergence of a new business elite that could challenge the incumbent political elite's grip on power. In the bigger picture, these findings advance our understanding of how the concentrated political power of autocratic government co-exists with the economic power concentration of capital, and how crony capitalism works in the context of authoritarian politics.

Our paper is related to several strands of literature. First, we contribute to the large literature on authoritarian politics and the ways in which authoritarian regimes use institutional mechanisms like elections, parties, or representation in parliament as strategies to co-opt threats to their political survival arising from citizens or existing elites (Blaydes 2008; Boix and Svolik 2013; Gandhi 2008; Gandhi and Lust-Okar 2009; Geddes et al. 2018; Meng 2020; Svolik 2012). We contribute to this literature by showing how ruling party elites—against the backdrop of natural resource windfalls—first construct and then co-opt emerging business elites using firm ownership and jobs in political office.

Second, an emerging literature focuses on political selection and the question of who becomes a politician (Folke, Rickne, et al. 2021) as well as the role of social networks and dynasties for political selection and rent-extraction (Cruz et al. 2017; Fiva and Smith 2018; Folke, Persson, et al. 2017). While selection into political office has been studied

in consolidated democracies (Dal Bó et al. 2017; Folke, Rickne, et al. 2021) and authoritarian regimes (Bokobza et al. 2022; Gandhi and Lust-Okar 2009; Jia et al. 2015; H. Liu 2019), we know little about what makes firm owners select into politics and what makes it attractive for political parties to recruit candidates from the world of business, particularly in authoritarian regimes where close ties to the ruling party may matter more than competence or business experience for entry into politics. We contribute to the literature studying political selection—and the role of social networks—in electoral autocracies by showing how ruling elites use social and dynastic ties to shape selection into both markets and politics in the wake of sudden inflows of foreign investments caused by the discovery of large stocks of natural resources.

Third, we contribute to the literature on patronage politics in authoritarian and dominant party regimes and the way patronage is used as a strategy to ensure political survival (Blaydes 2008; Bøttkjær and Justesen 2021; Lust 2009; Magaloni 2006; James A. Robinson and Verdier 2013). We expand upon to this literature by directly studying how a ruling party uses patronage appointments—in the form of firm ownership and jobs in politics—to shape emerging business elites and their pathway into political office.

Finally, it is well-established that business owners occupy prominent positions in politics at both national and subnational levels across the world (Geys and Mause 2013; Szakonyi 2021a) and that business elites are often over-represented in political office (Page et al. 2018). Developing political institutions make it more attractive for business owners to select into office in order to extract rents (Gehlbach et al. 2010; Gehring and Schneider 2020). The work of Szakonyi (2020) shows that in such institutional environments, firms may seek direct representation in political office to hedge against politicians who renege on their commitments to serve as agents of the firm. While this is consistent with our story, we expand upon this work by emphasizing how authoritarian regimes use vertical political integration as a means of shaping business ownership and selection into political office. Indeed, evidence also suggests that the descriptive representation of business owners in political matters in both democratic (Kirkland 2021; Page et al. 2018) and non-democratic (Szakonyi 2021b; Truex 2014) regimes: Business people generally prefer more pro-business

policies than the wider public, and tend to pursue those policies once they enter political office. We contribute to the literature on the entry of business elites into politics by providing evidence from an electoral autocracy on how incumbent political elites vertically integrate members of the new business elite into the organizational structure of the ruling regime in ways that contribute to regime stability.

2.2 Business Elites and Authoritarian Politics

The question of when and why governments recruit business elites into political office remains a puzzle—particularly in the context of authoritarian politics where decision-making powers are concentrated with a small political elite. Indeed, it is not obvious why authoritarian rulers would want to share power in the first place (Geddes et al. 2018; Meng 2020; Svolik 2012), let alone why they would do so in the case of potentially powerful business elites with access to economic resources that might constitute a challenge to their survival in office (Acemoglu and James A Robinson 2006). For business elites too, it is not obvious why selecting careers in politics brings benefits. Even in authoritarian regimes, firms and business owners can often reap the spoils from political connections through rent-seeking and corporate political strategies like lobbying, without directly assuming seats in parliament or government (Bonardi et al. 2005; Szakonyi 2020; Wintrobe 1998).

Tensions between political and business elites may increase when countries experience sudden shocks to their economy—for instance in the form of windfall revenues from discoveries of natural resources like oil or gas. Positive shocks to the economy—arising around events like natural resource discoveries—are likely to alter the nature of markets by generating fast-paced private sector growth with a correlated emergence of new firms and a new class of business owners and executives with skills and competencies to navigate profitable markets and valuable economic resources. The sudden growth of private sector firms and the emergence of a new business elite has the potential to disrupt the existing power equilibrium and threaten the persistence of the ruling political elite (Acemoglu 2016). This is particularly the case in a scenario where new business elites arise exogenously to the ruling regime—with no prior connections or ties to existing political

elites. However, authoritarian governments can respond to economic shocks by leveraging a set of strategies and selection mechanisms—which we call *vertical political integration*—that allow them to shape both the composition of firm ownership and the recruitment of business elites into the organization of the authoritarian party-state.

Vertical Political Integration: Bringing Business into Government

Vertical integration is a widely used concept in the theory of the firm and transaction costs economics to denote situations where a firm substitutes market exchange with external actors for “in-house” organization of production (Whinston 2003; O. E. Williamson 1971, 2008). Vertical integration is typically considered an alternative strategy to market exchange in contexts where contracting with external actors—i.e., horizontal integration on the market—gives rise to high transaction costs, for instance, due to protracted costs of bargaining, monitoring, and enforcement of contracts. When transaction costs from exchanges on markets are high, the potential for vertical integration and internal organization of production increases (O. E. Williamson 1971, 2008).

From our perspective, vertical *political* integration denotes situations where a political party or government directly integrates business elites and firm owners into its political organization and/or the political institutions of the state.¹ In the context of authoritarian politics, this means that the ruling party brings business elites “in-house” and integrates them into the political decision-making process of the ruling party and the political institutions of the authoritarian state. Rather than engaging in transactions with firms and business elites as external actors on the market for political connections and firm lobbying, business elites are directly internalized into the hierarchy of the ruling regime’s political organization. This form of vertical political integration contributes to addressing two fundamental problems of authoritarian politics: An information problem

¹Thorlakson (2013) considers how vertical integration works in the context of political party organizations. Haber et al. (2003) use vertical political integration in a looser sense to characterize systems with “blurring of the lines between asset holders and the government” and a broader integration of the public and private sectors. In contrast, our use of the term pertains to the direct integration of business elites into political organizations and institutions, e.g., through positions in government or seats in parliament.

and a commitment problem.

The Dual Information Problem

Authoritarian governments face systemic problems of information asymmetries induced by their strongly hierarchical organization and formal concentration of political power in the hands of a small ruling elite (Svolik 2012; Wintrobe 1998). Establishing formal political institutions like parliaments and parties (Blaydes 2008; Gandhi 2008) is often not enough to alleviate informational asymmetries between business elites and the ruling party unless businesspeople are granted *de facto* representation in those institutions. In authoritarian regimes and settings with developing institutions—with few or weak formalized mechanisms of political accountability—vertical political integration brings benefits to both ruling political elites and business elites because it is a relatively effective strategy for reducing political transaction costs and facilitating the exchange of information between business and government.

First, authoritarian governments need access to information to govern markets and industries (Robert Wade 1990)—regardless of whether they are motivated by rent extraction or more benign attempts to foster economic development. Business elites and firms can facilitate access to industry- and firm-level information that governments can use as input for drafting regulation and legislation that constitutes the institutional framework of markets (Dür et al. 2015). Even if this information is biased in favor of business interests (G. M. Grossman and Helpman 2001), the political integration of business elites into the ruling party and state institutions may lower the costs of gathering information—a key feature of transaction costs (O. E. Williamson 1971, p. 114; North 1990, p. 27)—and help governments in their decision-making process. Second, it is notoriously difficult for authoritarian rulers to gain credible information about the loyalty and support of citizens and (business) elites (Haber 2008; Svolik 2012; Wintrobe 2009, 1998). Integrating business elites into the political organization of the ruling party provides authoritarian governments with more credible information on the political preferences and loyalty of business elites—and better opportunities to monitor their actions. This makes business

elites less of a threat to the political survival of ruling party members.

The information problem in authoritarian regimes is two-sided and also applies from the perspective of business elites. Lack of transparency on policy-making processes and rent distribution is a hallmark of authoritarian government (Boix and Svolik 2013). For firms and business elites, this is an information problem that limits their ability to monitor government actions and creates uncertainty about the policy environment they operate in. For firms, lack of information—and the correlated policy uncertainty—can lead to bad investment decisions or cause firms to hold off investments, which may negatively impact their corporate performance (G. Liu et al. 2021).

Corporate political connections can serve as channels for transmitting information from the political system to firms (G. Liu et al. 2021), which may reduce policy uncertainty and is useful for rent extraction from the political system. Indeed, it is well-established that firms and business elites benefit from political connections in ways that improve their stock market returns (Acemoglu and James A Robinson 2006; Fisman 2001), profits (Szakonyi 2020), and protect their personal wealth (Markus and Charnysh 2017). For firms, political connections are often cultivated through corporate political strategies like lobbying.

The success of such indirect strategies relies, however, on the availability of established institutional channels for gaining access to the political decision-making process,² or on politicians serving as loyal agents of firms in the political system (Szakonyi 2020)—both of which are strong assumptions in authoritarian and political systems with developing institutions. The direct integration of firm owners into the political organization and institutions of authoritarian government attenuates informational asymmetries to a stronger degree and creates direct information networks between firm owners and politicians. For business elites, vertical political integration provides a venue for monitoring that the ruling party enforces regulations and property rights in ways that are beneficial to them (Haber et al. 2003, p. 31), which reduces the chances that the ruling political

²An example of institutionalized access is the deliberation councils set up in several Asian 'Tiger' economies (Campos and Root 2001) which granted business and labor organizations a voice in shaping government policy.

elite exploits its position of power exclusively for its own benefit (Boix and Svolik 2013). Vertical political integration is therefore a much more effective way of credibly exchanging and monitoring information flows between firms and authoritarian elites. Not only does it grant business elites access to information relevant for their market strategies; but it also provides them with access to politically generated corporate rents and direct influence on shaping and monitoring the rules and regulations governing the industries they operate in.

The Dual Commitment Problem

Economic shocks accompanied by the rise of new business elites—and the entry of new firms into the economy—also give rise to a dual commitment in authoritarian politics, which increases political transaction costs from exchanges between governments and firms. From the perspective of authoritarian leaders, business elites may constitute future contenders for political power. Indeed, prior research points to a trade-off between competence and loyalty in authoritarian politics (Egorov and Sonin 2011; H. Liu 2019). This trade-off—whether real or perceived—can lead the ruling regime to view the rise of a new class of successful business elites and firm owners as a signal of competence in business as well as in politics, which could constitute a potential threat to their survival in office (Acemoglu and James A Robinson 2006). Therefore, an emerging class of business elites with no prior ties to the regime cannot credibly commit to providing the loyalty and support that the regime needs for its political survival. Rather than engaging in costly repression, this makes it tempting for authoritarian rulers to employ strategies like vertical political integration to defend and bolster their grip on power relative to the new business elite.

From the perspective of firm owners and business elites, the incumbent political elite governing an authoritarian regime may likewise be seen as a potential threat as they cannot commit to forgo future political decisions that involve sudden regulatory changes or forms of soft or hard expropriation of investments (Justesen 2015)—or to implement favorable corporate policies to firms (Jensen and Malesky 2018). The regime has incentives

to make promises to firm owners that they are committed to private sector development, but from the vantage point of politically unconnected firms, those promises are likely not perceived as credible. Vertical political integration can serve as a strategy for making the ruling regime's political commitment to firms—and firms' loyalty to the ruling regime—more credible.

To see why this is the case, consider that vertical political integration is a way of allocating jobs in political offices to business elites. In line with the work of James A. Robinson and Verdier (2013) and Bøttkjær and Justesen (2021), who study patronage in the relation between voters and politicians, vertical political integration relies on mechanisms of business-government patronage where seats in government are allocated in return for political support.

Compared to redistribution and rents that may or may not be handed out as one-shot transfers (Magaloni 2008), a job in politics provides an enduring and repeated flow of benefits and resources to firm owners. This includes the opportunity to use their competence and expertise to shape the regulations and tax rules that govern their own firms—with a huge long-term potential for personal returns. Recruiting business elites into political office therefore provides business owners and executives with a direct stake in the regime's survival. Importantly, for the ruling party, the distribution of patronage positions in political office is a selective benefit that is reversible—and can be taken away if firm-owning officeholders renege on their commitments to stay loyal to the regime (James A. Robinson and Verdier 2013). Indeed, since property rights to firms—and licenses to operate businesses—are reversible, rulers can also extend and withdraw those privileges, much like rulers have the discretion to allocate—and take back—patronage jobs (Haber et al. 2003; Justesen 2015; James A. Robinson and Verdier 2013). This makes the success and survival of firms directly contingent on the loyalty and political success of business elites in political office. While vertical political integration almost surely leads to some form of authoritarian crony capitalism, for the ruling party it contributes to rewarding business elites who stay loyal to the regime—which ultimately increases regime stability (cf. Meng (2021b)).

Credibility Mechanisms: Predistributive Politics and Social Networks

Our argument so far emphasizes that in authoritarian and political systems with developing institutions, vertical political integration alleviates information and commitment problems in relations between firms and governments. However, it does not eliminate the political transaction costs induced by the two problems; nor does it imply that exchanges between business elites and politicians will run smoothly and without friction (Haber et al. 2003). We point to two mechanisms that increase the effectiveness of vertical political integration as a strategy for crafting stable and enduring relations between authoritarian governments and business elites.

First, authoritarian rulers can distribute property rights and ownership of firms to select groups in society (Haber et al. 2003). By selectively allocating and enforcing property rights and business licenses for partisan supporters or regime loyalists, firm ownership becomes a mechanism of predistributive politics: it shapes property rights and asset ownership on the market before taxes and transfers. Importantly, using the political distribution of firm ownership, the ruling regime can construct a class of new business elites and firm owners. That is, the ruling party may actively shape who gets to own firms and run businesses in industries that are important to the regime (e.g., the natural resource industry). This means we can distinguish between two versions of vertical political integration: A weaker version where an exogenously evolved business elite with no prior ties to the regime is co-opted and integrated into the organization and institutions of the ruling party. And a stronger version where the regime endogenously constructs business elites using predistributive allocation of property rights and firm ownership—and then provides jobs in political office to members of the new business elite.

Second, to make vertical political integration more credible as a strategy that distributes firm ownership and uses the pool of new firm owners as the basis for recruitment into political office, authoritarian rulers may prefer to deal with people who are closer in their social network—people they estimate they can have confidence in. Prior work shows that social proximity and centrality in networks increase cooperation (Chandrasekhar et al. 2018) and make it more likely that people will reciprocate with political support (Cruz

et al. 2017). In authoritarian politics too—with its developing formal institutions for third-party enforcement and monitoring—social networks that build ties between business and politics are likely to increase confidence between the ruling party and business elites. Therefore, variation in the centrality of members of the social network of the ruling party elites allows the authoritarian government to better estimate the loyalty of future firm owners and political officeholders.

Social network-based selection into firm ownership and political office constitutes a way to calibrate the incentives of the existing political elite and new business elites. As emphasized by Cruz et al. (2017), the family is still the most important social institution in most societies and family members are a central part of politicians' social networks around the world. We, therefore, expect that dynastic relations—as an important case of social networks more broadly—are a prominent way in which authoritarian rulers implement strategies of vertical political integration. This allows the regime to both construct new business elites using dynastic networks—and then use those dynastic relations as a basis for integrating new business elites into the organization of the ruling party and the state. This makes new business and political elites less of a threat to the political survival of incumbent authoritarian elites and, arguably, contributes to regime stability.³

Overall, in the context of Mozambique's authoritarian politics, the empirical implication of our theoretical argument is that we should observe, first, an increase in firm ownership by people with (social) ties to the ruling FRELIMO party following the discovery of large deposits of natural resources in 2009. Second, we should observe a disproportionate recruitment of people into politics from the new pool of dynastically-connected business owners.

³While even close allies, including family members, may constitute a threat to the political survival of ruling elites (Meng 2021b; Svolik 2012), placing family members into politically connected firms and jobs in political office means that the corporate and political inner circle of the regime is both proximate in the social network through dynastic ties and have a material interest in regime stability.

2.3 Context: Mozambique's Political Economy

This section outlines the main context of political selection in Mozambique. Section 1.3 provides further information about the history of Mozambique and its ruling elite.

Since its independence from Portugal in 1975, Mozambique has been ruled by FRELIMO, a socialist movement that led the struggle for independence. Despite facing internal and external threats to its rule, FRELIMO has proven to be resilient, in part due to its power-sharing approach within the organization. This approach allowed for pluralistic factions within FRELIMO, at least while economic rents remained sparse. The party also set up constitutional succession rules, presidential are elected with a two-term limit that has been in place since the first multiparty elections in 1994. Members of parliament - the Assembly of the Republic - are likewise elected under a closed-list system in elections with universal franchise. However, despite reforms to introduce nominally democratic institutions in Mozambique, the country is effectively an electoral autocracy where government power is firmly concentrated with the FRELIMO party, which has won every election since the inaugural multi-party contest in 1994.

The dominance of FRELIMO also extends to the private sector, which has been structured around economic policies established in 1987 in exchange for financial support from the Bretton Woods Institutions and the Paris Club creditors. As in other former socialist countries, the privatization of state-owned enterprises in Mozambique led to the growing influence of well-connected politicians or their associates (Hanlon and Mosse 2009). While ties to FRELIMO are omnipresent in the private sector (see Chapter 1), qualitative evidence suggests that primarily senior figures with both executive and party influence capture the largest share of rents (Salimo et al. 2020).

Before large discoveries of gas attracted large inflows of foreign direct investment in 2009, the formal private sector economy was small and undiversified in Mozambique. This is in part due to colonial rule, during which Mozambique's formal economy was based on sugar exports to Portugal and exported labor to South African mines, and in part due to sixteen years of civil war. In 1987, the resulting economic hardship led the

FRELIMO government to sign a comprehensive deal with Bretton Woods institutions that required the conversion or closure of state-owned enterprises. Rather than facilitating an independent private sector, privatizations represented a ‘marriage between the politician and businessman’ (Pitcher, 2002, p. 118). While the Bretton Woods deal did take direct economic power away from the state, the state maintained indirect power via politically connected businesspeople. Ironically, given FRELIMO’s vast networks, privatization in many ways allowed the FRELIMO government to consolidate its economic and political power, which it has held onto since.

Indeed, business and politics have always been closely intertwined in Mozambique with ample opportunities for politically induced rent-extraction as a corollary. Samora Machel, president of Mozambique after independence in 1975, frequently mentioned corruption concerns in his speeches (Stasavage 1999). Importantly, there has never been legislation in Mozambique restricting politicians or public servants from pursuing business interests (Levy and Williams 2014) and the concentration of economic and political power in the same individuals has been noted by several scholars (Cortês 2018; Pitcher 2017, 2002). As outlined in Section 1.3, already in 2007, before the gas bonanza, the Indian Ocean Newsletter described the relationship between business and politics in Mozambique as closely interwoven for decades,

In recent years, the connections between business and politics in Mozambique have gone in both directions. Politicians such as former president Armando Guebuza accumulate significant influence in the private sector, while business owners have also entered politics. The case of former minister Letícia Deusina da Silva Klemens illustrates the latter case. Klemens started her first company in 1997 and expanded her business network over the years, focusing on the intersection of foreign business, imports, and public procurement. Her business partners included family members of three previous Mozambican presidents. In 2016, she was appointed as Minister of Natural Resources and Extraction, causing a significant backlash within FRELIMO, as she never held any important political or party mandate beforehand.⁴

⁴During the first wave of privatizations, FRELIMO also established party enterprises such as Imprensa Comercial do Índico, Limitada, and the investment holdings, SPI - Gestão e Investimento and Focus 21.

This is the context from which to understand the discovery of gas in Mozambique and its consequences. While explorations for hydrocarbons in Mozambique go back to 1904, a peace agreement in 1992 allowed the exploration to intensify. The government hosted licensing rounds in 2000 and 2006, and the first large discovery⁵ was made in Cabo Delgado by Andarko in 2009 (J. Cust et al. 2021).⁶ Firms discovered nine more giant gas fields in the same region in the following years (J. Cust et al. 2021). This non-linear exploration process suggests that even though donors, private companies, and the government of Mozambique had high expectations to find large gas resources at some point, no one could predict the exact timing of the discovery. Given such an uncertain character, giant gas discoveries are a well-established gateway for identifying causal effects because they can - under certain identifying assumptions - be treated as natural experiments. Prior research has leveraged this unpredictability to examine the implications of resource discoveries in business cycles (Arezki et al. 2017), democratization (Tsui 2011) or job-creation and FDI investments (Toews and Vézina 2022).

Case Selection

These features of the Mozambican context make it an ideal case for our purposes for three reasons. First, Mozambique is an electoral autocracy dominated by a long-time ruling party, FRELIMO (Morse 2015). While elections are held at regular intervals, FRELIMO dominates Mozambican politics and commands a strong grip on state power, the institutions of the political system, and the economy. Mozambique therefore offers a good case for studying autocratic selection in the context of one-party rule presiding over large discoveries of oil and gas which profoundly changed the nature of the private sector in the country.

Second, the embedded nature of connections between business and politics in the Mozambican case means that it is ideally suited for examining the strategies authoritarian

In recent years, these entities have become dominated by single politically connected families or have become irrelevant in economic terms.

⁵Defined as estimated ultimate recovery (EUR) reserves between 500 and 4999 million barrels of oil equivalent.

⁶The discovery of the Pande field pre-independence is a notable exception.

regimes use to shape selection into political office in the wake of natural resource bonanzas. However, to study the role of firms and business elites in authoritarian selection, we need granular individual- and firm-level data that enables us to reliably identify both political officeholders and firm owners. This is a challenge in many countries, not least in authoritarian countries where governments often maintain tight control over information and publicly available government data. Mozambique, however, is - to the best of our knowledge - one of the few authoritarian countries where we can leverage uniquely granular data on firm ownership scraped from a national gazette containing information on all formally registered firms - which we then match with data on the names of political office holders.

Finally, our research design relies on the causal identification afforded by a temporal shock—large discoveries of gas in 2009—that leads to an uptick in newly established firms and a new class of business elites. For the purposes of our study, oil or gas discoveries serve as plausible “shocks” to the economy due to three unique features: 1) they signal increasing production possibilities, which is important in our case as this should correlate with the rise of business elites, 2) there is a delay between discovery and production, providing for a relatively clean cut-off point in time, and 3) the timing of *actual discoveries* is plausibly exogenous and unexpected given challenges associated with oil and gas *exploration* (Arezki et al. 2017). Within the context of oil and gas discoveries, the discovery of LNG in Mozambique is both comparatively large (the third largest ever) as well as relatively recent (of the 371 major oil and gas discoveries (defined by at least 500 million barrels of recoverable oil or equivalent) since the 1970s, 84 were in the 2000s and 24 were in the 2010s (Horn and Myron 2011). This makes Mozambique an excellent case for studying how authoritarian rulers recruit business people into political office following large discoveries of natural resources.

2.4 Methods and data

Our theory of vertical political integration leads us to expect two related patterns: *a)* when businesspeople found companies related to gas extraction, they will be more likely

to be recruited into the political system, and *b*) businesspeople with political connections are more likely to gain ownership of gas-related companies.

To examine these questions, we need to address two obstacles. First, like in many other developing countries, there is no encompassing and ready-made database of firms or business elites in Mozambique. Similarly, there is no go-to data source that provides a detailed overview of who has served in political office and when. Second, even if such data were readily available, firm ownership is not randomly distributed across the population, which creates obstacles to causal inference.

To address these issues, this section describes how we collect novel data on all beneficial owners of firms registered in Mozambique since independence, and how we collect and match these data with information on who has held political mandates at various levels of government during the same time period. Additionally, we outline our identification strategies, and how they enable us to estimate the causal effects of *a*) firm ownership on the likelihood of obtaining a seat in political office, and *b*) the gas discovery on firm ownership for people who are central in the network of ruling political elites.

Firms, beneficial ownership and gas companies

We identify the beneficial owners of all formally registered entities since independence, using a national gazette called the *Boletim da República, Serie III (BdR3)*. This publication offers information on firms as unstructured text data. We scrape this data and consider it to be the universe of formally registered firms.⁷ Importantly, the information includes the names of all the beneficial owners. The data also allow us to capture changes in these registrations as well as closures.⁸ Figure 2.4.1 lists the number of annual registered firms from 1975 to 2020. This substantiates the point we made earlier that prior to the recent gas discovery, Mozambique hardly had any formalized private sector.

The next challenge in the data is to identify owners of firms related to gas extraction among the thousands of firms in the country. In particular, we are interested in identifying

⁷Chapter 1 also follows this approach.

⁸The bulletin entries after 2007 are publicly available as PDFs from a governmental website, a database that lists each entry in the bulletin with a separate index and can be purchased from the commercial broker Pandora Box.

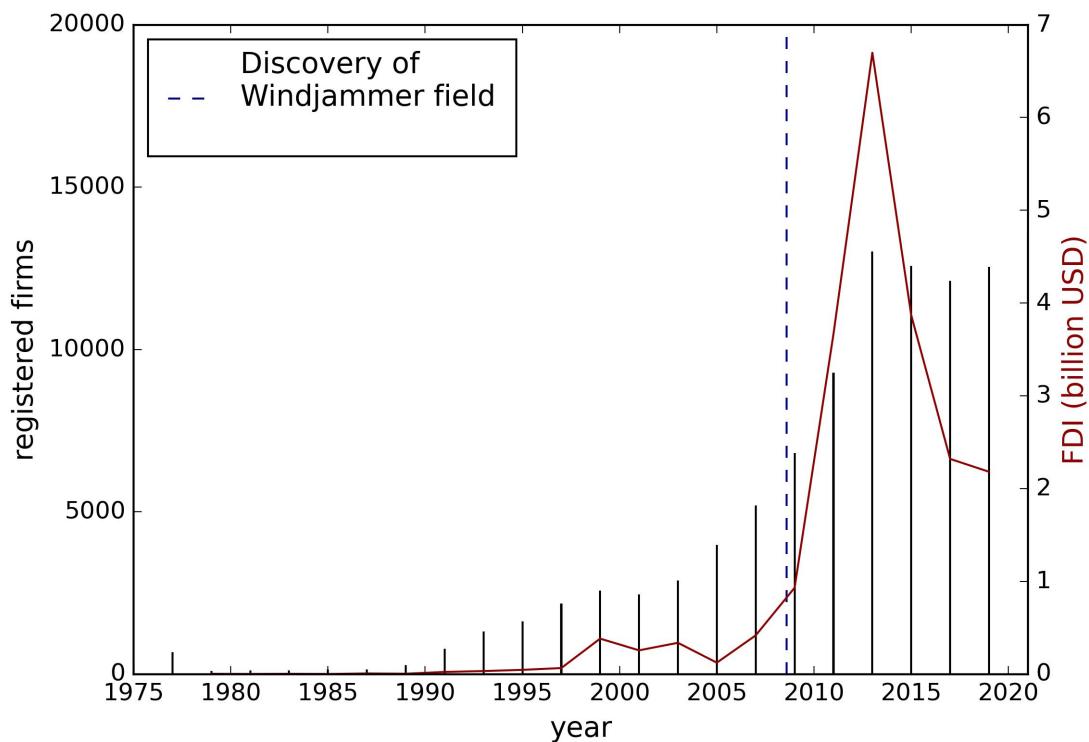


Figure 2.4.1: Firm registrations and FDI inflow in Mozambique. **Note:** The left scale (bars) lists the number of annual registered firms (BRD3), the right scale (lines) list estimations of FDI inflows into Mozambique in billions of USD World Bank. Table 1.2 disaggregates the industry type of registered firms.

firms that supply products or services used to extract gas. This is because we need to distinguish between the firms that conduct the actual gas extraction—which are large multinationals where direct politician involvement is very rare—and the local Mozambican firms that operate in the supply chain of the gas industry and which are more likely to have direct involvement of national politicians. These are the firms we will call ‘gas-related’ firms. To address this challenge, we use the firms’ mission statements, where they describe their core business areas. We build a dictionary that allows us to identify firms of interest, using input from two experts in the field: one is an academic teaching gas extraction at a major technical university in Europe. The other works in a major multinational gas extraction company. The experts supplied us with a university textbook (Fink 2021) for engineers that describes chemicals, fluids, and mechanical parts used to extract gas. We use this to create a dictionary containing distinct keywords such as *drilling fluid disposal* or *filter-cake*. Based on this dictionary, we identify firms of interest to us through their mission statements. See Appendix 2.A Table 2.A.2 for examples of mission statements identified by the dictionary as related to gas.

Political mandates

Based on the institutional landscape of Mozambique, we consider ministers and vice-ministers, Members of Parliament (MPs), members of the party’s central committee and Polit Bureau, as well as regional governors to be the most relevant political positions for cultivating connections between business and politics. Compared to Chapter 1, this PEP measure includes additional mandate types and covers a longer time period. Executive and legislative political mandates are important – even in authoritarian regimes – as they wield powers to engage in both distributive and regulatory politics (Blaydes 2008; G. Liu et al. 2021; Szakonyi 2020; Truex 2014). While party mandates formally do not relate to any institutional power, FRELIMO has maintained some characteristics of a socialist one-party system, such as a central committee or a Polit Bureau, which makes political mandates within the party organization relevant too.

Based on this, we match the names of people serving in political office to our list of

Table 2.4.1: Political mandates and firm ownership

	=< 2009		> 2009		1975 – 2022	
	Politicians	Business	Politicians	Business	Politicians	Business
Governor	43	31	33	20	69	46
MP	136	53	256	82	361	122
Minister	111	74	75	55	163	110
Vice Minister	56	37	51	26	99	59
Central Committee	494	177	227	106	647	231
Polit Bureau	47	34	30	27	59	44
Gas owner	11	953	26	3921	42	3921

Note: The table shows the number of individuals with at least one active mandate ('Politicians') and additionally at least one business ownership ('Business') before/after the gas discovery in 2009 and for the whole period. Since some individuals hold multiple mandates, adding the number of mandates from the two separate time-periods gives a larger number than the sum of individuals with mandates for the full period. The last row lists the number of individuals an active political mandates and ownership in at least one gas related firm (in the 'Politicians' column) and the total number of gas related business owners (in the 'Business' column).

business owners from the bulletin. We define business owners as affiliated with the gas industry if at least one of their shareholding firms operates in this industry, as measured through the mission statements. We assume that firms operate until they are explicitly de-registered in the bulletin. Table 2.4.1 lists the number of individuals holding at least one mandate per mandate type, as well as the number of business owners with at least one firm per category. As Table 2.4.1 shows, the overall number of business owners among all politician types stayed relatively stable.

Measuring political connections

In our theory, we propose that business owners with social ties to politicians may be more likely to be installed in Mozambique's growing gas sector. To measure a business owner's social proximity to politicians, we leverage our data in two ways. First, we depart from the assumption that family networks continue to constitute the most important—albeit not the only—source of social ties in many countries, including Mozambique, and a key component in the social and political networks of politicians at all levels of political office (Cruz et al. 2017). Against this background, we estimate family networks based

on surnames and control for the frequency of names across the full set of individuals we identify. As a second approach, we identify partners across all entities in the BdR3 bulletin. This includes not only private companies but also civil organizations like NGOs, churches, committees, boards, etc. We assume that individuals share some individual ties if they are members of, e.g., the same board.

This allows us to build individual-level panels of political and business affiliations, including all private firms in Mozambique, firms that own major extraction licenses, and firms that supply important goods in this industry. We also document the affiliations of high-level political officeholders. Beyond these direct affiliations, we consider network dynamics between the two domains for close business partners and individuals with the same family name.

Identification

After collecting the data, we are still faced with challenges related to identifying the effect of *a)* founding companies related to gas extraction on the likelihood of political recruitment, and *b)* political connections on founding gas-related companies. Here, we will discuss each in turn.

Identifying the effect of firm Ownership on entering politics

In our main specifications, we model whether business elites select into political office as a function of their firm ownership. In this context, we cannot use the gas discovery as a shock, which we use later. Instead, we employ a difference-in-differences approach, where we compare whether a person who recently founded a business is more likely to select into politics compared to people who did not recently found a business.

We use variations of the following two-way fixed effects model:

$$Pol_{it} = \delta Firm_{it} + \Gamma_i + \omega_t + \epsilon_{it}.$$

Here Pol is a binary indicator of whether businessperson i gains a political mandate (i.e. selects into politics) in year t . $Firm$ is a binary indicator of whether the business

elite founds (or gains ownership of) a firm in year t . Γ and ω are individual and year fixed effects, respectively. Using these two-way fixed effects makes this a difference-in-differences specification (Goodman-Bacon 2018a)

This implies that the estimates are identified under the assumption that the probability of entering political office would have evolved in parallel, had the treated person not founded a business in that year. While we examine trends before treatment, it is not possible to test this assumption, and there are two main threats to identification. First, business owners are not a random subset of the population but instead differ markedly from non-business owners. Second, people are strategic in when they choose to found a firm. That is, the people who select into firm ownership—or strategically time the founding of a firm—are different in several respects from the people who do not found or own firms, and the characteristics that affect selection into firm ownership may also systematically affect the likelihood of obtaining a political mandate. If selection into firm ownership is not close to random, it becomes difficult to distinguish the effect of firm ownership from other observable and non-observable characteristics that are correlated with firm ownership and simultaneously affect the likelihood of holding a seat in political office.

To alleviate these problems, we follow two design-based strategies. First, we only include people in our sample who at some point gain ownership of a firm. Thereby, we identify the average treatment effect on the treated (ATT) based on the timing of firm ownership alone. This alleviates the problem that certain types of people might select into firm ownership. Second, we estimate a difference-in-difference-in-differences (or triple differences) model, where we use the founding of *any company* as our placebo control. This placebo test allows us to compare people who found a gas company to people who found any company. This allows us to take into account that people may choose to found firms at certain points in time.

Finally, it should be noted that two-way fixed effects is a biased estimator of difference-in-differences when treatment is staggered and the effect changes over time (Goodman-Bacon 2018a). Therefore, we also use the Sun and Abraham (2021) estimator, which

ensures that already-treated units are never included in the comparison group, thereby eliminating Goodman-Bacon (2018a) bias.

Political connections and ownership of gas-related companies

Finally, we investigate whether connections to the traditional political elite facilitated ownership of gas companies. Since we have just estimated the effect of owning a gas company on political selection, we need an exogenous shock to identify when different types of politically connected people can select into ownership of this new type of firm. We use the sudden discovery of gas, which we have described previously, as this shock.

We use this to examine whether *a*) people who held political mandates prior to the natural resource discovery, *b*) their family, and *c*) their business partners saw their holdings in gas companies increase relative to the general private sector elite. The challenge for estimation is that because the formal private sector was expanding with an extreme pace in this period, general business holdings trended upward very strongly. This induces problems with pre-trends biasing a standard difference-in-differences estimator. To deal with this, we use the generalized synthetic control estimator (Xu 2017). The technique uses an interactive fixed effects model to find a weighted average of control units that closely resembles the treated group during the pre-treatment window. Using this synthetic control group ensures pre-treatment balance. When estimating the synthetic control model, we use cross-validation to select the number of components in the underlying factor model that will be used in estimating the synthetic control model.

2.5 Results

Motivated by our theory of vertical political integration, we present two main sets of results. First, we show that ownership of gas companies pushes businesspeople into political office. Second, we use the discovery of large gas resources in Mozambique to show that the establishment of a gas sector increases the family members of politicians' holdings in gas companies, while the politicians themselves and their business partners experience a lower probability of owning such companies.

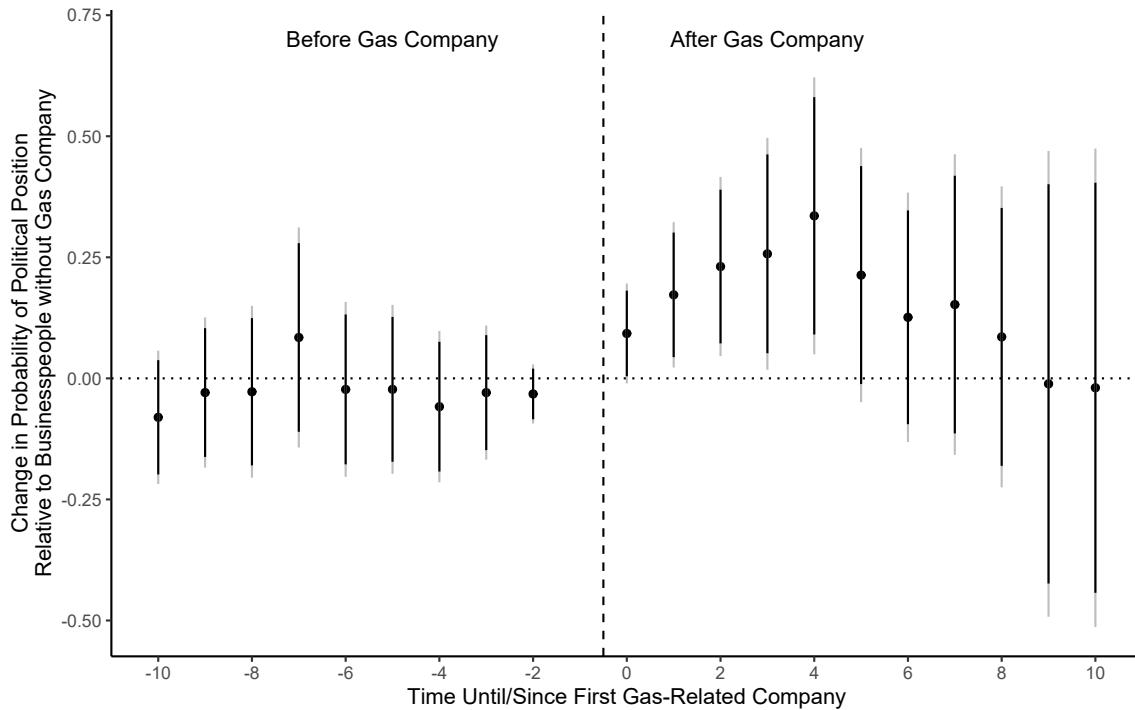


Figure 2.5.1: Event Study Estimates of the Effect of Owning a Gas Firm on Selection into Political Office. **Note:** The figure shows how gaining ownership of a company in gas extraction increases the probability of a political mandate, and how this effect changes over time using the Sun and Abraham (2021) estimator. Zero on the horizontal axis shows the difference-in-differences estimate in the first year after a company was founded. Lines are 90% robust confidence intervals clustered at the individual level. The model includes data from 2005 and onward.

Ownership of gas companies and political selection

In the first set of results, we use a difference-in-differences approach to show that businesspeople who gain ownership of gas companies become more likely to enter political office. This is the first step in the vertical political integration process.

Figure 2.5.1 visualizes the effect of founding a gas company on the probability of entering political office, using data from 2005 through 2020. We present event study difference-in-differences estimates from the Sun and Abraham (2021) estimator of staggered treatment assignment. This allows us to track how the effect changes over time after the businessperson founds their firm. We find that the probability of gaining a political office increases substantially after the founding. Additionally, there is no apparent pattern before this happens, which implies that the individuals who eventually gained ownership of gas companies followed parallel trends with those who did not.

Next, Table 2.5.1 shows estimates from a series of regression models with individual and time-fixed effects implementing our difference-in-differences design. This estimator is used, because we need to estimate interaction models, which are not handled well by the Sun and Abraham (2021) estimator. Additionally, the estimates in Table 2.5.1 are quite similar to the ones in Figure 2.5.1, suggesting that the fixed effects regressions are not severely biased. Columns (1) and (2) regress a binary indicator of entering political office on 1) an indicator of owning a private company and 2) the logged number of companies owned. In columns (3) and (4) we zoom in on companies specifically related to the gas extraction industry. Overall, we show that founding such a company more than doubles the probability of entering office relative to the unconditional baseline probability.

As mentioned earlier, it is not random *when* a person gains ownership of a firm. To deal with this issue, in column (4), we estimate a triple-differences model, where we use the founding of any private company as the placebo control. This allows us to remove the confounding effect arising from business elites strategically founding firms at certain points in time. Doing so shows a very large increase in the probability of entering political office.

A key proposition in this study is that the effect of ownership of gas companies should be concentrated in the close social network of politicians as measured by kinship. In column 5, we examine this idea by interacting our main treatment indicator of gas ownership with a binary variable capturing whether the businessperson is part of a politician's family. The results show that the effect is concentrated among family members of politicians. An important threat to identification in this specification is that a large proportion of family members of politicians may go into politics at some point, and politicians may also want to distribute firm ownership to those family members. The relation between the two variables may, therefore, simply proxy for the high level of ambitions that the family members of politicians have. To deal with this threat, we construct a placebo variable using ownership of *any* type of firm and interact that with the indicator of being a family member of a politician. However, it is evident from the interaction term in column 6 that for family members of incumbent politicians, obtaining any type of firm

ownership (as opposed to ownership of a gas company) is not associated with obtaining a political mandate. Instead, the effect is concentrated among family members who own firms connected to the gas industry. These results reassure us that it is ownership of a gas company that pushes the people who are closest—and arguably most loyal—in the social networks of incumbent politicians into office.

Overall, these results provide backing for our proposition. However, two related concerns should be noted. First, the effect sizes may seem relatively small. However, this is the case, because very few businesspeople select into political office. Compared to the low baseline probability of holding political office, founding a company related to gas extraction approximately doubles the probability of selecting into political office. Second, most of our estimates over the effect averaged over the full post-treatment period are statistically significant at the 10% level. This, too, is because of the small proportion of businesspeople selecting into office. However, our large dataset does allow us to detect the effect at this level of confidence. Additionally, we saw in Figure 2.5.1 that the effect was strongest and most precisely estimated in the first few years after the firm ownership was established. Since the estimates in Table 2.5.1 show the results averaged over the full post-treatment period, they will mechanically be more noisy.

To examine whether these effects are associated with the discovery of natural resources, in Figure 2.5.2, we cut the data into a series of five-year windows. Additionally, we use all data since 2000. This allows us to examine whether the effect is concentrated in the period after gas discovery. We then estimate the baseline specification within each window. Each window starts at year t and runs through year $t + 5$. The following window will then start at year $t + 1$ and run through year $t + 6$. For example, in the first iteration, we estimate on data from 2000 through 2004. In the second iteration, we use data from 2001 through 2005. The starting point of our last model is 2015, where the window ends with the period observed in our dataset. We then estimate the two-way fixed effects models within each period. The results show that the effect hovers around zero in the period prior to the natural resources discovery and is quite large afterward.

Table 2.5.1: Firm Ownership and Gaining Political Mandates

	(1)	(2)	(3)	(4)	(5)	(6)
Own Company?	0.016 (0.010)					0.019 * (0.009)
# Companies Owned		0.039 ** (0.014)				
Own Gas-Related Company?			0.175 * (0.085)	0.158 + (0.090)	0.037 (0.048)	
Gas X Family					0.559 + (0.313)	
Company X Family						-0.012 (0.021)
Num.Obs.	2 150 517	2 150 517	2 150 517	2 150 517	2 150 517	2 150 517
Num. Individuals	126501	126501	126501	126501	126501	126501
Unconditional Probability of DV	0.08	0.08	0.08	0.08	0.08	0.08
Individual FE?	Yes	Yes	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variable is an indicator of a political position multiplied by 100. Standard errors clustered by individual. +, *, and ** indicate statistical significance at the 0.1, 0.05 and 0.01 levels, respectively. Results based on data from 2005-2021.

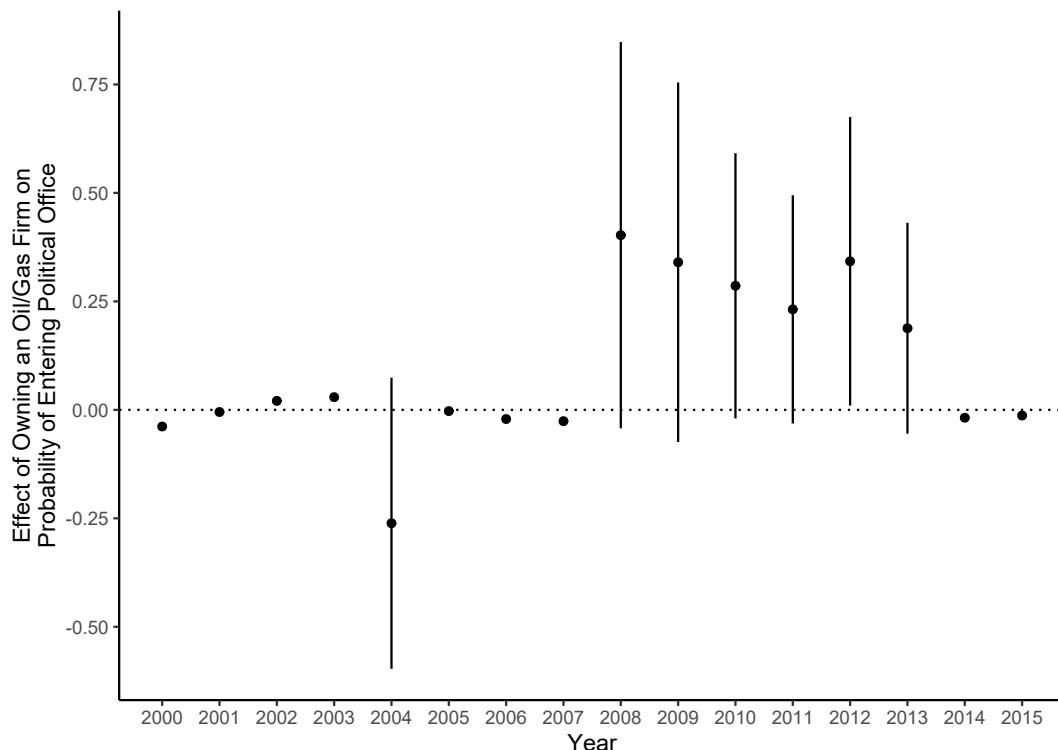


Figure 2.5.2: How the effect varies over time. Note: The figure shows the effect of founding a gas-related company on gaining political office in a moving window analysis, where each model is estimated on five years of data. Lines are 90% robust confidence intervals with individual-level clustering.

Political connections and gas-related company ownership

As we have theorized, it is possible that the political realm itself plays a role in shaping the upcoming private sector. This could happen by giving business people with whom the politicians are closely connected ownership of important companies. To investigate whether that is the case, we now examine whether having political connections makes it more likely to gain ownership of a company in Mozambique's upcoming gas-related industry. We use the unexpected discovery of gas to identify the effect of political connections on ownership of gas-related companies. We estimate a series of generalized synthetic control models, where the treatment group is whether prior to discovery the businessperson was, respectively, *a*) a politician, *b*) a family member of a politician, or *c*) a business associate of a politician. The results are presented in Figure 2.5.3 and show how the probability of gaining ownership of a gas-related company changed since the gas was discovered.

As we can see, the synthetic control group provides a very close match to the treatment group in the years until the gas discovery. Upon the natural resource discovery, the probability that the people who held political mandates before the discovery owned a firm related to the gas industry decreased markedly relative to the synthetic control of business owners. The estimates are only statistically significant for the first two years after the discovery, however, they remain strongly negative despite their noise (Panel A). Similarly, business partners of the traditional elite (Panel C) also see their ownership of gas firms decline. These estimates are much more precise and statistically significant across the post-treatment period. Importantly, however, family members of pre-discovery politicians (Panel B) see their ownership *increase* very dramatically.

One important threat to identification is that prior to the discovery, ownership of gas-related companies was simply not a possibility. When the possibility arises, connected people naturally grasp it and gain ownership. A related concern is that this could simply be about corruption: when the shock of gas discovery sets in, politically connected businesspeople seek to gain ownership of gas-related companies. In that case, the observed patterns would not be about integrating a rising political elite. Rather, it would be about the use of political power for personal gain. Two pieces of evidence speak against these

concerns.

First, for both concerns, it is useful to contrast the findings for family members of politicians with the findings for incumbent politicians and their business partners. As we have seen, ownership among both the politicians themselves and their business partners drops. This suggests that it is not simply opportunity that drives the increase among family members of politicians. Rather, by virtue of their connections to politicians, they gain ownership and are able to use this ownership to later enter political office. Second, for the corruption concern, it is useful to examine how experts view corruption in Mozambique. In Appendix 2.C, we use data from the V-Dem dataset (Coppedge et al. 2023) to examine whether executive embezzlement – a particularly relevant type of corruption for this context– changed around the time of gas discovery. We find no clear pattern in how executive embezzlement has changed after gas discovery.

Taken together, these two pieces of evidence suggest that there is no reason to believe that neither corruption nor opportunity could drive the entire set of results, we have presented here.

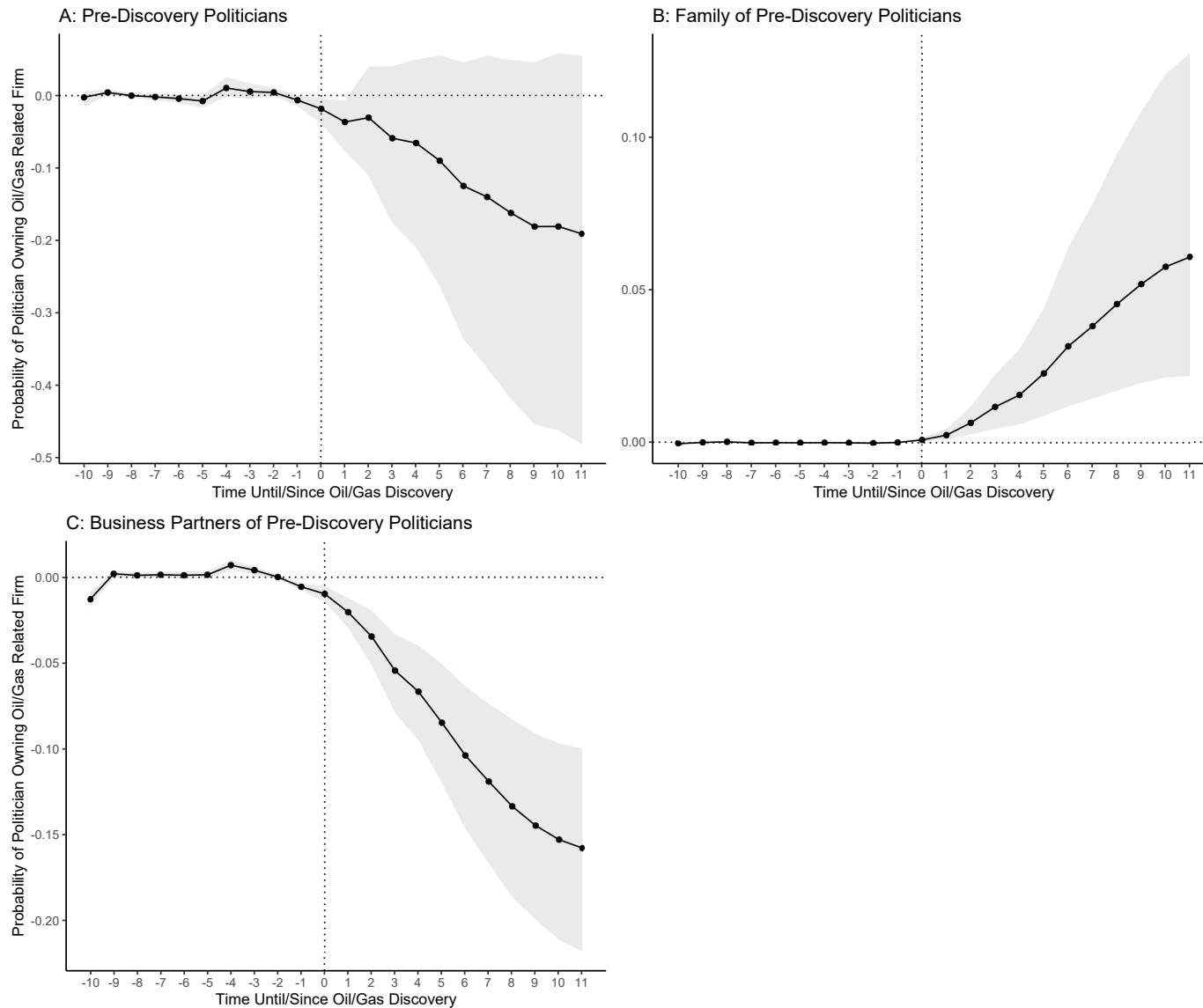


Figure 2.5.3: Gas Discovery, Elites and Ownership of Gas Companies. Note: Estimates are from the Xu (2017) generalized synthetic control estimator. Shaded areas are 90% confidence intervals. The number of factors used in the underlying interactive fixed effects models are found using cross-validation. We use one, two, and one factor, respectively, in Panel A, Panel B and Panel C.

2.6 Discussion

Our results provide empirical support for our theoretical model of authoritarian political selection. Based on a variety of difference-in-differences estimators—and a research design that addresses the challenges of self-selection into firm ownership—the results demonstrate that owning a company affiliated with the gas industry increases the likelihood of being recruited into politics. This effect was concentrated after the discovery of the gas reserves: the influence of business owners without a prior political career increased after the gas discovery. Indeed, founding a company affiliated with the gas industry more than doubles the probability of entering office relative to the unconditional baseline probability. Finally, we find support for the proposition that the effect of ownership of gas companies is likely to be concentrated in the close social network of politicians: Family members of pre-discovery politicians see their ownership increase dramatically, pointing to the pivotal role of dynastic relations in authoritarian politics.

A broader challenge related to this research is the difficulty in identifying firms and firm owners in the context of less-developed authoritarian regimes. While major databases such as Bureau van Dijk's ORBIS and Dun and Bradstreet provide some coverage in these contexts, it pales in comparison to what we were able to construct using a national Mozambican gazette. While these empirical challenges may make it difficult to compare the results of this study to other work that uses these more conventional data sources, they also imply that our results—and the data we leverage—are much more comprehensive and draw on a much richer source of information than most existing work. The quality and comprehensiveness of data we have collected combined with a strong research design for causal inference implies that our paper has a stronger empirical basis for shedding light on how and why authoritarian ruling parties sometimes integrate firm owners into the organization of the party and the state.

Given that our evidence derives from a single case—Mozambique—there are scope conditions surrounding the extent to which our findings may generalize to other contexts. Our theory relies on the following conditions. First, our argument is built around sudden economic shocks. The argument is most relevant in contexts where there are unexpected

economic changes, such as natural resource discoveries,⁹ significant foreign investment, or technological innovations that create new market opportunities. These changes give rise to the requisite new business elites. Second, for the argument to hold, the state must have sufficient control over economic levers to influence who becomes a part of the business elite, such as through licensing, regulation, or direct investment. This is typically found in authoritarian contexts. Third, the regime must have some degree of social network centrality. In other words, the regime's ability to identify and strategically integrate individuals who are already somewhat central in existing social networks is important for applicability. Fourth, and related to the second and third conditions, the state must have relatively weak rule of law around corruption, providing a pathway for illicit connections between business and politics.

Despite these scope conditions, we expect the theory to travel beyond the specific case. For example, while the paper focuses on the gas industry, the theory could be applicable to other sectors where significant economic changes are occurring, such as technology, manufacturing, or renewable energy. The argument may also be applicable to related types of authoritarian regimes with durable one-party dominance, including military juntas and monarchies, which may also utilize vertical political integration. The theory might also be relevant in autocracies or transitional regimes where the ruling party or coalition is seeking to solidify its power base in the face of economic changes. It is likely also useful for understanding elite dynamics in other countries in the Global South undergoing rapid economic transformations, particularly in those with developing institutions and those with economies that rely heavily on natural resources. The geographically most proximate cases are other regimes in East Africa relying on variations of electoral authoritarianism and which are home to recent oil and gas discoveries, such as Tanzania and Uganda, or even electoral democracies with developing institutions, like Kenya. Bolivia, which had a large discovery in the late 1990s, is likely the closest case in Latin America. Such cases also share Mozambique's relatively low level of economic development (Chapter 1) as well as its relatively developing institutional set-up. While this implies that our

⁹We also note that gas is a particularly sensitive and conflictual sector (Hickey et al. 2015; Salimo et al. 2020).

findings probably do not apply to wealthier authoritarian regimes—just as Mozambique’s history of conflict and civil war obviously is a unique feature of the country—it is likely that the type of vertical political integration we examine serves as a more widespread strategy in countries that share some of the key characteristics of the Mozambican case.

2.7 Conclusion

Why would authoritarian governments bring business elites into government—and what benefits do business elites in political office provide for authoritarian governments? We argue that autocrats recruit business elites to serve in government as a defense strategy when new business elites emerge, particularly in the wake of sudden market changes, such as natural resource discoveries. We advance this argument by developing a theory of vertical political integration in authoritarian politics. Our theory shows how actively shaping selection into firm ownership and using the pool of new firm owners as a basis for recruitment into political office allows ruling parties to respond to two fundamental problems of authoritarian politics: an information problem and a commitment problem.

Indeed, rather than blocking change caused by economic disruptions in markets (Acemoglu and James A Robinson 2006), ruling political elites can take on and actively shape selection into ownership of new firms and selection of business elites from new firms into political office. In this way, the ruling political elite maintains control of both government and the new business elite. This strategy of vertical political integration goes much further than conventional co-optation mechanisms (Blaydes 2008; Gandhi and Lust-Okar 2009; Magaloni 2006) because the ruling regime does not only co-opt an outside elite that has emerged exogenously to the ruling party; rather the ruling regime endogenously constructs the new business elite and integrates it using recruitment into jobs in the political organization of the state and ruling party.

We test this argument by leveraging a natural gas discovery in Mozambique as a natural experiment that causes a shock to markets - and firm ownership in the country. Empirically, we construct a novel dataset of political office-holders before and after the discovery of gas and match these office-holders to the full universe of business owners since

Mozambique gained independence. Using a variety of difference-in-difference models, we show that the gas discovery caused a large increase in firm ownership for people who are central in the social network of ruling political elites. We also demonstrate that new firm owners in the gas industry are more likely to be recruited into politics and that this effect is concentrated among individuals who are proximate to the social networks of ruling party politicians.

Our findings have important implications for the existing literature. First, while a large literature demonstrates that authoritarian regimes use various co-optation strategies to neutralize threats to their political survival (see among others Blaydes (2008), Boix and Svolik (2013), Gandhi and Lust-Okar (2009), Knutsen, Nygård, et al. (2017), and Meng (2020)), our findings add to this literature by addressing the related but understudied question of selection into positions of political power in authoritarian regimes. We demonstrate that authoritarian regimes can neutralize the threat of new business elites to their political survival by installing central members of their network in the emerging industry and then using these positions as firm owners as a platform for recruiting business owners into political office. In the wake of economic shocks, authoritarian governments may actively shape new business elites – and their selection into political office – in ways that consolidate the power of the ruling regime. As such, this study shows that authoritarian regimes are not merely reacting to external shocks but are proactive in shaping economic structures to serve political ends. This extends the existing literature by showing that authoritarian regimes can be agents of economic structuring rather than just passive respondents to market dynamics.

Second, and related, the theory we develop of vertical political integration can be applied to related contexts. For example, how do mature democracies respond to the rise of new political movements or business elites? How do traditional parties integrate newcomers emerging from grassroots activism, tech entrepreneurship, or social media influence? In countries with strong military institutions, the concept could be applied to understand how ruling elites integrate military leaders into governance structures, particularly in scenarios where there is a sudden shift in geopolitical conditions or the

internal security landscape. This can also be applied to ethnic and sectarian divides: how and when do regimes bring in elites from minority groups into political office as a way to ensure stability? Third, our study pushes our understanding of the role social networks play in elite formation and governance. We show that not just economic capital, but also social capital (proximity to the ruling party's social network), is instrumental in determining who becomes a part of the ruling elite. Fourth, this paper shows that by recruiting new business elites into political roles, regimes can better navigate both the information problem and the commitment problem. In this way, this study enhances our understanding of how authoritarian regimes can strategically use economic shocks to solve core governance issues.

Future research should undertake a comparative study of the political conditions under which resource shocks disrupt or consolidate political power. It should also consider how vertical integration of new elites into political office addresses challenges of clientele loyalty and information asymmetry. Further, it should consider variation in the type of resource shock by magnitude and commodity. For example, the discovery of a relatively common natural resource, such as coal or iron ore, may generate a different effect than the discovery of a relatively rare resource, such as rhodium or platinum. Additionally, the current position in the commodity price cycle for that resource likely matters. If gold is discovered in the trough of the commodity price cycle we might expect different effects than we would during the upswing or peak of the gold commodity price cycle. A related interesting question is what happens to authoritarian power in the world in which gas (or some such resource) has already been discovered but an external event (such as the Russian invasion of Ukraine) causes an exogenous supply shock. For example, future research could consider the economy-shifting effects of the heightened global demand for gas in the wake of the Russian invasion on Algeria, Nigeria, and Egypt, as well as on Mozambique.

Appendix

2.A Identifying firms and their field of activity

To identify firms that supply gas companies, we identify technical terms related to gas extraction in the mission statement ('Objecto social') of firm entries. To derive these terms, we first take the intersection between the autotranslated corpus of all mission statements and the corpus from a gas extraction text book (Fink 2021). Next, we apply a Name Entity Recognition (NER) algorithm to select only nouns that are longer than three characters. Finally, we manually prune this list of keywords and filter out generic terms. The final set contains 205 words. Table 2.A.1 lists the twenty most frequent keywords that we find in the missions statements.

Table 2.A.2 illustrates for examples how the sentiment of the mission statement allows us to identify firms related to the gas extraction industry. These examples illustrate how many firms work with providing consultancy services or with supplying various commodities needed in the extraction process.

2.B Name matching

Scholars of social data science propose different ways to fuzzy match entity across different samples. While packages like (fastlink (Enamorado et al. 2019) are useful for map information with at least two dimensions, such as the name of a firm and its address or the name of a person and their birth day we can not leverage these approaches for our purposes. In most cases, we only have the name person without any additional information. We therefore rely entirely on fuzzy string matching to identify individuals

Table 2.A.1: Gas extraction terms in mission statements

term	appearance in mission statements
oil	923
gas	835
drilling	260
resulting	256
suspension	150
proliferation	35
pipeline	33
fluid	26
conjunction	19
rotating	16
compression	11
sensitivity	11
substitute	11
stabilization	10
continental	10
angle	10
Polyurethane	9
preferential	9
atmosphere	8
effluent	8

Table 2.A.2: Mission statement examples

Company name	Mission statement (translation)
Djuncane Servicos e Consultoria	<p>a) Consultancy in oil and gas management;</p> <p>b) Personal and business assistance, organizational strategy;</p> <p>c) Market research and Marketing research;</p> <p>d) Provision of financial services such as financial advice, credit design;</p> <p>e) Cleaning services and other related activities;</p> <p>f) Real estate, namely, exploration, management and leasing of real estate, sale of real estate, intermediation in real estate purchase and sale operations, among others;</p> <p>g) Provision of services. The company may carry out other subsidiary or complementary activities of its main purpose, provided that they are duly authorized.</p>
Platinum Global Sourcing	<p>a) Provision of consultancy and engineering support services in the oil sector, specifically, consultancy in corrosion, drilling, exploration, geology, geophysics and project management;</p> <p>b) Provision of hydraulic, mechanical and piping engineering support services;</p> <p>c) Provision of environmental and safety assessment services in oil fields, including environmental monitoring, pollution control and prevention services, etc.;</p> <p>d) Provision of maintenance services for drilling and marine equipment;</p> <p>e) Manufacture and construction of mechanical, structural, piping, including underwater workshops for oil fields;</p> <p>f) Import, export and sale of instrumentation equipment, drilling machines, marine equipment, paints and coatings, production equipment, valves, etc.; [...]</p>
Markson Mozambique, Limitada	<p>a) Maritime transport and offshore shipowners;</p> <p>b) Land transport of passengers and miscellaneous cargo;</p> <p>c) Intermediation, agency and commercial representation of national and foreign companies;</p> <p>d) Construction, repair, import and supply of ships, their accessories and miscellaneous equipment;</p> <p>e) Supply of oil and gas technology and equipment;</p> <p>f) Ship fuel supply service (Bunker vessels);</p> <p>g) Consultancy, provision of services and assistance in the area of, maritime transport, oil, gas and others;</p> <p>h) And provision of related services.</p> <p>By decision of the partners, the company may also carry out related, complementary or subsidiary activities to the main activities, and may also acquire shares in the capital of other national or foreign companies, regardless of the branch of activity, provided that it is duly authorized by the competent authorities.</p>

across data sources, but compare first and surnames separately. This approach might pose the issue of false matches in other cases, considering all individuals with the name Paul Smith as the same person would be a disproportionate assumption in the US. However, in the context of Mozambique, this might be less of an issue. First, less than two hundred thousand individuals registered an entity in Mozambique between 1975 and 2022. This implies that we don't match on the population as whole, but only on the < 1% who are shareholders in at least one formal entity. In addition, we control for the relative frequency of family names.

Defining surnames

As a first step, we select the last word of a persons name string as their surname. To control for inconsistent notations of the same name, use term frequency - inverse document frequency (tf-idf) to calculate cosine similarities between strings. We match family names with a similarity of 96 % together (i.e. strings like "elali" and "el-ali") and find 196 duplicate names among 36368 unique surnames.

Defining individuals

Next, we group all first and middle names by their surnames. And fuzzy match first and middle names if they are similar. Based on this standardize name pair, we define individuals as the same person, if first and last name are identical and the remaining middle names are a subset of another (i.e. we match Benjamim Guilherme Tomás da Costa António, Benjamim Guilherme Tomás Costa Antonio and Benjamim António the same person but Abílio Carlos Langa and Abílio Fernando Langa as two different individuals. As third step we fuzzy match names again using a more higher threshold of 89 %. as Table 1.D.1 illustrates.

The most likely false positive matches of individuals occur very likely between close family member. While we cannot rule out the possibility of this type 1 error without increasing the likelihood of type 2 errors to a large extent, we can leverage the structure of the bulletin to minimize them. If two names occur in the same entry of the bulletin,

we reject the fuzzy match between two strings regardless of their similarity.

Another potential for type 2 could be false family links due to commonly known names. To address this issue, we exclude the three most common family names "Silva", "Santos" and "Cossa" as family affiliation. The largest remaining family cluster is called "Langa" and consists of 714 individual names, i.e. family names. The mean family cluster size is 4.2, the median is 1.

2.C Executive Embezzlement in Mozambique

In Figure 2.C.1 we show V-Dem Coppedge et al. (2023) expert-based estimates of how executive embezzlement has changed over time in Mozambique. This is a particularly relevant form of corruption to investigate in this context, because it signifies whether executives use their office for personal gain. As we can see, embezzlement is almost completely stable in the period before gas discovery. While there is some movement after, it has gone in both directions. Embezzlement improved in the period after discovery, then deteriorated, and finally improved slightly in the end of the time-period. Overall, this pattern cannot explain the findings we have presented in this paper.

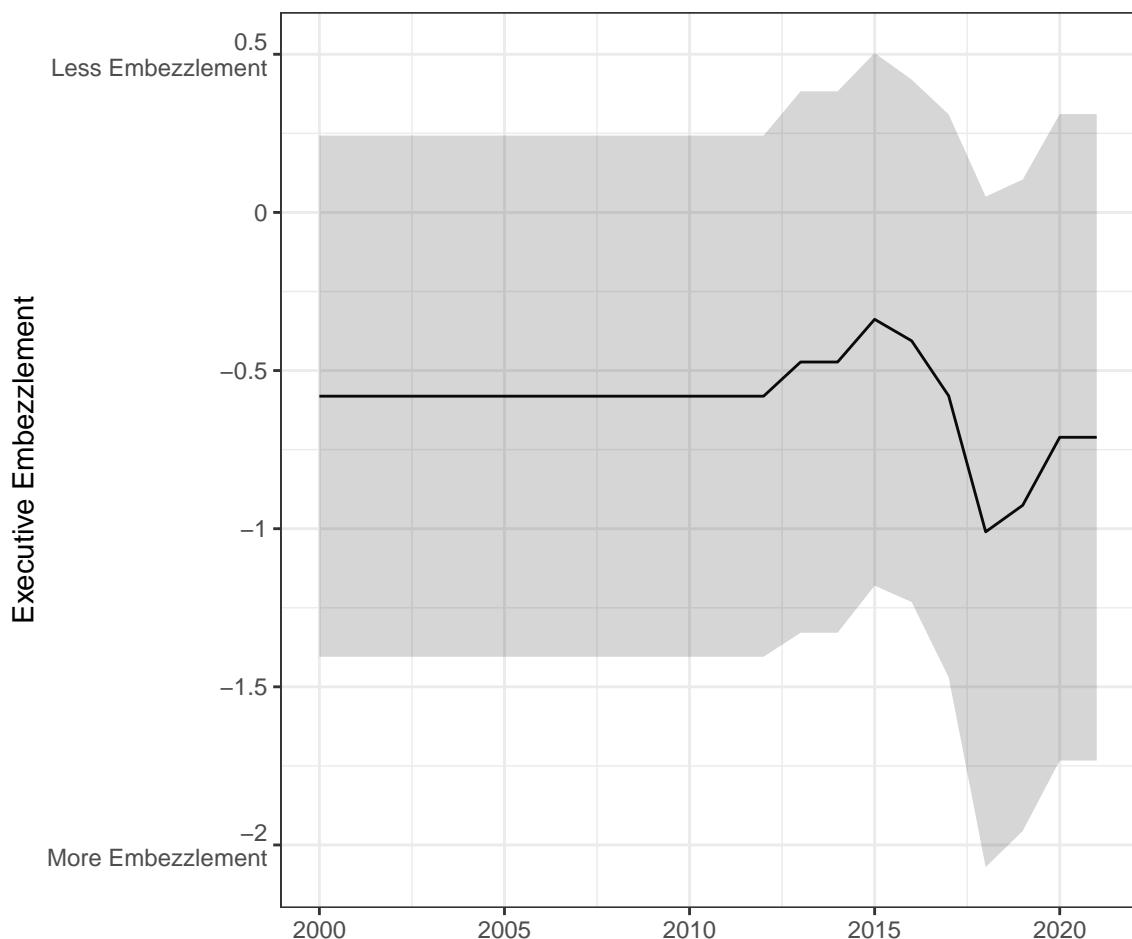


Figure 2.C.1: Executive Embezzlement in Mozambique, Note: The solid line shows the V-Dem estimate of executive embezzlement in Mozambique, and the shaded area shows the 95% credible interval.

Chapter 3

Property rights under selective enforcement:

How mining cadastres relate to conflict in low income countries

FELIX SCHILLING, COPENHAGEN BUSINESS SCHOOL

3.1 Introduction

Do mining licenses reduce the link between economically valuable minerals and local conflict? The relationship between increasing commodity prices for minerals and conflict events around mines extracting these minerals has been a subject of significant interest and concern among researchers, policymakers, and stakeholders. In countries with low state capacity, minerals fuel conflicts between state and non-state actors such as rebel groups (Berman et al. 2017; Collier and Hoeffer 2004), small-scale miners and industrial miners (D. Christensen 2019; Rigterink et al. 2023). One key factor that contributes to such conflict events is the gap between the legal (*de jure*) and actual (*de facto*) ownership over mines and the economic rents they create.

Improved documentation of ownership over assets can, in return, cause property

rights gaps (Albertus 2021), which refers to the differences between the legal recognition and protection of property rights. Such disparities lead to disputes and tensions among stakeholders. Establishing property rights over mining activities could therefore lead to more conflict events than unregulated mining. Understanding the effects and mechanisms around property right gaps is crucial for comprehending the dynamics of contemporary mineral-fueled conflicts. Contests over mineral extraction are further exacerbated by climate change and the increasing demand for so-called "green" minerals in the supply chain of electronic consumer goods (Nguyen et al. 2021) and the economic importance of artisanal mining as supplementary income for farmers (Girard et al. 2022).

The legal status of mines in low-income countries has become increasingly important in recent years. Firstly, significant aid payments are contingent on building administrative capacities in mining cadastres to improve mining license documentation. To motive for these aid payments are to foster economic development, good governance, transparency, and responsible resource management. While the enforcement and provision of property rights highly depend on domestic political intuitions, technical solutions alone improve the documentation costs of property rights. Additionally, policies like the Dodd Frank Act section 1502 (hereafter DFA) increased the importance of ownership documentation for minerals known as the "3Ts" (tin, tantalum, and tungsten) by requiring companies to disclose their use of conflict minerals and ensuring that their supply chains are free from funding armed groups in the Democratic Republic of the Congo (DRC) and its neighboring countries. The implementation of the DFA caused an asymmetric shock to the economic value of property rights in the mining sector of the affected countries. *De jure* ownership of T3 mines became increasingly useful, while the value of licenses for other commodities did not change.

Studying the relationship between commodity prices, mining licenses and conflict is a complex task. Firstly, the availability and reliability of data on mining activities and their legal status are difficult to access. Secondly, there are issues of endogeneity to contend with. The allocation of resources to formalize ownership over an asset class is typically influenced by factors such as economic wealth, state capacity, historical roots, or cultural

norms. To address these challenges, this analysis examines mining licenses in the DRC and its neighboring countries, which face exogenous increased demand for property rights documentation over T3 and reduced costs to build up capacities in the mining cadastres. In sum, these events caused exogenous variation in the provision costs and utility of mining licenses. By analyzing original and publicly available data from these cadastres, I overcome the constrain of access to data and study the full set of mining licenses affected by the DFA in countries with operating online cadastres in 2023. By triangulating the *de jure* status of mines and actual mining activities, I derive a novel and more granular measure of mining production and producers. This measure covers the entire spectrum of mining activities, from artisanal to industrial mines.

The paper empirically examines and rejects the proposition that robust investment in property rights within the mining sector, demanded and financed by foreign actors, has the potential to mitigate increasing conflict levels if minerals become economically more valuable. Theoretically, investments in the administrative capacities of mining cadastres can improve the documentation of property rights, establish clear ownership frameworks, and foster stakeholder cooperation. These improvements should, in turn, lead to less local conflict near mines with licenses, as property rights become more transparent and easier to enforce.

However, I argue, and demonstrate with original data, that mining license reduce local conflict only if their terms are enforced by independent actors. In such contexts, mining licenses reduce local conflict only if independent actors enforce them. In the absence of institutional constraints, the most powerful actors in a market shape the design and enforcement of mining licenses. In resource-extracting low-income countries, such actors are multinational firms and domestic political forces.

Anecdotal evidence supports this argument. Mine privatizations at the end of the second Congo war caused conflicts between artisanal and industrial mining companies, as multinational firms received the exclusive rights to extract lucrative resources that had been extracted by artisanal miners before the privatizations (Gulley 2023). Gaps between the *de jure* and *de facto* status of mining activities are also documented for T3

mining in eastern DRC and its neighboring countries after the DFA began regulating these commodities. To export T3 without proper ownership documentation, miners use informal channels such as smuggling and relabeling the origin of minerals (Ojewale 2022).

Before presenting the analysis and its underlying data in detail, the following section elaborates on how property rights can help resolve existing mining-related conflicts and how political preferences influence the provision of such licenses. Next, I discuss how the DFA and technological innovations in mining cadastres provide a unique case to observe differently enforced property rights in low-state capacity settings. The final section concludes with the implications of the findings of this paper.

3.2 Theory: How property rights gaps relate to mining conflicts

The literature finds great potential in the establishment of strong and universal property rights. Scholars associate them with lower risks of expropriation (Besley and Ghatak 2010), higher firm value (Berkowitz et al. 2015), more investment (Goldstein and Udry 2008), and long-term economic growth (Acemoglu and S. Johnson 2005).

The potential of property rights to increase social welfare is particularly promising in the context of resource extraction, as this sector is not only economically crucial to many low-income countries but also relates to multiple types of conflict. Without exploring this mechanism in detail, early quantitative work conceptualizes mining conflicts between rebel groups and government actors (e.g., (Berman et al. 2017; Collier and Hoeffler 2004)). To observe exogenous variation in the economic value of mining activities, most studies in the mining conflict literature consider commodity prices as exogenous factors. Empirical evidence supports these expectations (e.g., Galiani and Schargrodsky (2010) and Ho (2021)), but few studies have explored these issues in countries without sufficient levels of state capacity and domestic initiatives to establish property rights . Conducting a meta-analysis of 46 natural experiments, Blair et al. (2021) find that price changes for lovable artisanal minerals provoke conflict, while price changes for other com-

modities tend not to. on average, do not change conflict risks. Recent work points out that mining conflict often emerges between private actors and industrial operating mines. D. Christensen (2019) finds that conflicts associated with mines emerge due to incomplete information – a common cause of conflict in industrial and international relations. Neither party to a potential agreement knows with confidence what the other is willing to be satisfied with. At the same time, the possibility of agreement explains why mining often induces protest instead of full-fledged battles between belligerents. The study suggests that transparency dampens the relationship between prices and protest. Rigterink et al. (2023) provide evidence that competition between artisanal and industrial miners is also an important source of natural resources-related conflict. They find that a commodity price shocks increases the likelihood of a violent conflict event roughly three times more in locations with industrial mining where artisanal mining is feasible as in places with industrial mining but no potential for artisanal mining.

Analysis of the question of which incentives political leaders have to withhold property rights in the context of land reforms is sometimes facilitated by invoking the concept of "property rights gaps". Property rights gaps are disparities between total economic production and legally sanctioned, property rights driven production among different individuals or groups within a society. These gaps occur when certain individuals or groups enjoy secure and enforceable property rights, while others, often marginalized or disenfranchised populations, have limited or insecure rights to own, control, or transfer property. Scholars of land reform find that property rights gaps are an important reason why land reforms often do not lead to the desired results (Albertus 2021). The literature offers two explanations for these gaps, beginning with weak state capacity. Even when foreign donors provide technical solutions that rationalize mining cadastres, maintenance and compliance enforcement of these registries is left to domestic bureaucracies. Where administrative capacities are missing, property rights are simply not awarded (Joireman 2007; Toulmin 2009). A second type of gap emerges if politically powerful actors deliberately tailor, award, or enforce property rights to enhance the prospects of their own political survival. Both democratic and authoritarian leaders have incentives to reward

allies or exclude rivals (Hassan and Klaus 2023). In the context of resource extraction, property rights can regulate market access, investment incentives, and the probability of expropriation. Since property rights are difficult to revoke, leaders are incentivized to reward long-term allies rather than short-term supporters with legal recognition of mining activities. Finally, property rights gaps can help politically powerful mining companies protect their assets against other stakeholders. Recent empirical work on mineral conflicts highlights the importance of dynamics between large-scale miners (LSM) and ASM (Rigterink et al. 2023) or the local population (D. Christensen 2019).

Moving on to the institutional effect of property rights gaps, Winters (2011) stresses the importance of selective property rights enforcement as a way to justify claims by powerful individuals such as oligarchs. Exclusive control over the right to assign property rights plays therefore a crucial role in wealth defense and a way to maintain non-democratic rule over societies. Winters (2011) argues therefore that wealth defense, including exclusive possession of property rights, is the core political dynamic and objective for all oligarchies.

To summarize, the literature finds a positive relation between the economic value of mines and nearby conflict, while it associates property rights with lower conflict levels as they make it easier to solve disputes and enforce the rule of law. This implies that newly established property rights over a mine should temper the link between commodity prices and conflict nearby mines extracting these commodities. Property rights gaps, on the other hand, might cause the absence of such moderating effects. Figure 3.2.1 summarizes the causal relation between the economic value of a mine, conflict and property rights. A property rights gap moderates both the economic value of a mine and the level of local conflict over access to extractable resources. Where they exist, these gaps mediate which miners will gain access to and effect of property rights.

These gaps are either genuine capacity constraints or constraints a state deliberately creates to exclude some actors via access to rights or their selective enforcement. This implies that property rights have more characteristics of a club – rather than a public good. They cause welfare losses and also political spillovers. Such spillovers can become

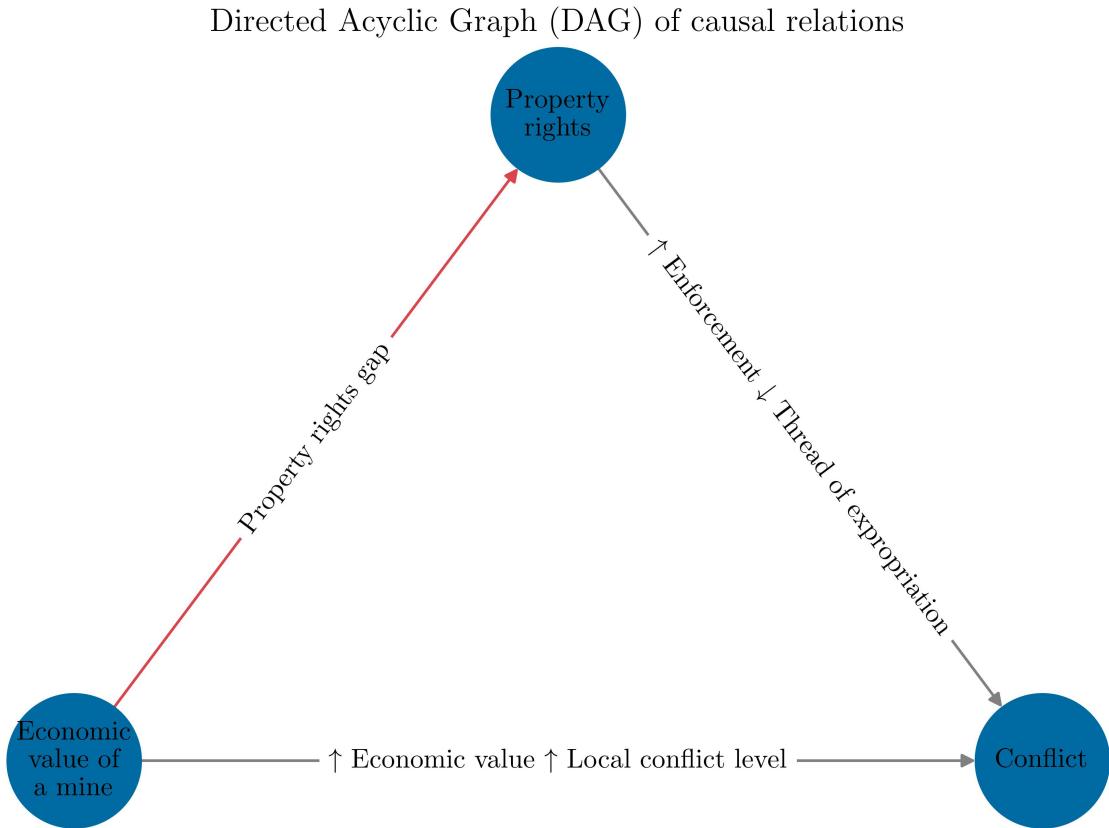


Figure 3.2.1: Directed Acyclic Graph (DAG) of the causal relations between the economic value of mining activities, property rights and conflict. If no property rights gap exists, moderate property rights local conflict levels. If they exist, they mediate the political or economic power of a mine its access to property rights. In this case depends the effect of property rights on local conflict on the political or economic characteristics of each mine.

new reasons for conflict or welfare-inhibiting power-sharing mechanisms to maintain rule. Newly established property rights can influence local conflict levels in all directions and even increase local conflict levels if they create new channels for political influence and expropriation.

3.3 Context: The DFA and Its Effects

The issue of unclear property rights in the mining sector poses a significant challenge in the Democratic Republic of Congo (DRC) and its neighboring countries. While many large-scale mines (LSM) have operated since colonial rule, many sites are operated by small-scale, artisanal miners (ASM) without any legal documentation. Disputes over

access to resources exist between miners and political actors, as well as between ASM and LSM.

While the dynamics of these conflicts are heterogeneous, a particular instance of mining conflict receives a lot of attention among stakeholders in high-income countries. During and after the second Congo War (1998-2003), rebel military groups controlled ASM in the eastern Kivu region. These mines operate under devastatingly inhumane conditions and finance weapons purchases and more, leading to the term "conflict minerals". In response, policies like the Dodd-Frank Act (DFA) require public companies in the USA to disclose their use of 3T minerals in their products and confirm that they are sourced ethically¹.

The DFA and the public debate around conflict minerals impose multiple types of costs on companies that trade or use of undocumented commodities that might be conflict minerals. For one, the United States Securities and Exchange Commission (SEC) can audit and fine companies found not to comply with the DFA. Additionally, links between companies and illicitly extracted conflict minerals can cause long-term reputation costs, especially for companies that sell consumer goods. As in other fields of public regulation (Malhotra et al. 2019), corporations sought to preempt the implementation of the DFA² with their own schemes for due diligence reporting, or formalized their sector before these practices received extensive international attention. For instance, Dell implemented a Conflict Minerals Program in 2008 (Dell Technologies Inc. 2008) and in 2009, Apple began to exclude companies from its supply chain if they could not document that their T3 was ethically sourced³ (Apple Inc. 2019). However, as small-scale mining remains a crucial source of income for millions of people in the DRC and neighboring countries (Parker, Foltz, et al. 2016), a full embargo on conflict minerals has never been implemented.

Instead, donors finance and support efforts to formalize the mining sector in the affected countries and require due diligence reporting from private companies regarding

¹Initially, the DFA also required due diligence reporting for gold. However, a substantial volume of gold is traded in unregulated, informal markets, so gold has been excluded from the due diligence requirements (Parker and Vadheim 2017) minerals.

²Following the US initiatives, entities such as the OECD, the Chinese Chamber of Commerce, and the European Union have passed similar regulations.

³Based on the companies own definition of ethical extraction

the origin of the 3Ts they use. To provide the necessary administrative capacities to document ownership, mining cadastre systems not only record the beneficial ownership of mines, but also provide the administrative infrastructure for other bureaucratic tasks such as tax collection or environmental regulations. As a result, seven out of ten countries affected by the DFA now have publicly available online repositories of their mining licenses. Each country's decision about whether and how to formalize its mining sector with a cadastre is subject to domestic political processes.

When evaluating the effects of the DFA, scholars present a mixed picture. On one hand, the documentation of mine ownership has significantly increased in recent years. Today, a significant share of 3Ts is certified as "conflict-free". Unfortunately, the DRC's overall conflict level has not fallen (Parker and Vadheim 2017). Qualitative evidence suggests that licensing schemes for formal property rights have introduced new avenues of political influence over the mineral supply chain (D. Johnson 2013), including mining certification fraud and cross-border smuggling (Ojewale 2022). This suggests that political alliances with an actor who can provide legal documentation for the origin of 3Ts have become increasingly useful. The price of 3Ts without documentation of origin has dropped up to 80 percent compared to the world market (Carisch 2012). Transnational networks also play a crucial role in the second Congo War and subsequent conflicts (König et al. 2017).

These features make the DFA context an ideal case, for two compelling reasons. Firstly, the DRC and its neighboring countries extract both T3 and non-T3 minerals, enabling a comprehensive examination of the impact of the DFA on mineral-related conflicts and property rights enforcement. Secondly, the region has a long history of mineral-induced conflicts, with disputes over access to resources involving small-scale artisanal miners and large-scale mining operations. The presence of such long-lasting conflicts provides valuable context for studying the effectiveness of heterogeneously established and enforced property rights.

3.4 Illustration: Property right gaps in the DRC

The formalization of the mining sector in the DRC and neighboring countries has resulted in multiple types of property rights gaps. This section illustrates two instances of these gaps.

The first instance of property rights gaps is situated in cobalt production in the DRC, the world's largest source of this commodity. Cobalt mining is closely tied to the extraction of other commodities, as its ores often oxidate with metals such as nickel and copper. While cobalt production had therefore been a byproduct of other mining activities, the global demand for cobalt grew 26-fold from 2000 to 2020 (Gulley 2023). This increased demand is driven by the use of portable electronics and electric vehicles (EV) in the transition towards clean energy (Nguyen et al. 2021).

This increasing demand presents mining companies operating in the cobalt sector with a trade-off. Since cobalt has been a byproduct, there has been hardly any exploration for untapped deposits globally for decades. New investments in industrial cobalt extraction therefore require a long implementation period. Existing cobalt large-scale mining (LSM) operations, primarily located in the DRC, face a high political risk ⁴.

To increase existing production capacities without the risk of long-term investment commitments, artisanal and small-scale mining (ASM) is useful, as it is neither capital- nor technology-intensive. As outlined in section 3.3, is cobalt not defined as conflict mineral and hence not regulated by the DFA. However, pursuing ASM without legal regulation poses the same reputational threat and might provoke external regulations, similar to the DFA.

To improve the *de jure* framework of ASM cobalt mining, multinational mining companies like Glencore cooperate with the central government of the DRC to formalize the sector since 2018 (Deberdt 2021). Today, Glencore and many other companies face allegations of large-scale corruption activities during the same period (Financial Times

⁴For instance, the DRC's first prime minister, Patrice Lumumba, tried to nationalize copper and cobalt mines that became Belgian private property after independence (Radmann 1978). During the second Congo War, all industrial copper-cobalt mining in Lualaba and Haut-Katanga stopped operating (Geenen and Cuvelier 2019).

2022; Lipton and Searcey 2022). These events suggest that large extracting firms and the former national DRC government designed the legal framework for LSM and ASM cobalt mining in ways that favor multinational firms. Figure 3.4.1 illustrates this legal setting. The satellite image shows the location of five LSM projects that are partly owned by Glencore. The cobalt ores in this region have a high degree of cobalt, making them suitable for ASM⁵. Between the 1960s⁶ and 2005, hardly any constraints limited ASM operating in the region. Today, formal ASM licenses are awarded in the grey areas, while ASM in the actual mines is illegal. In contrast, multiple LSM licenses (not displayed in the figure) cover the entire area, including both ASM licenses and the actual industrial mining areas. Conflicts are documented between security forces and artisanal miners. Additionally switch former employees of the state owned companies into ASM after the mines got privatize(Faber and Krause 2017). Glencore claims that an average of 2,000 illegal miners enter their mines every day (Stans Bujakera and Aaron Ross 2019). In the present legal setting, ASM on land owned by multinational corporations itself is illegal and therefore not under the responsibility of these firms. The firms are for instance not liable if miners have accidents on the land they own. At the same time, ASM licenses for sites near the industrial mines enable ASM-mined cobalt to easily enter the supply chain which minimizes thread of additional regulation in the future.

A second example of property right gaps is the case of tantalum ASM in Northern Kivu. The export of tantalum is regulated by the DFA. Figure 3.1(a) plots awarded ASM production licenses and the actual locations of mines. The mines are located in the northern DRC, around 90 km to the border with Rwanda. The plot shows that only one of the fifteen mines within two $5km^2$ grid cells operated under an ASM license between 1998 and 2023. Qualitative evidence documents mineral smuggling activities from the DRC into Rwanda (Ojewale 2022). This provides rent capture opportunities and political leverage to the central government of Rwanda, the DRC, and local groups like the March 23 Movement (M23), a rebel military group formed mainly of ethnic Tutsi. For instance,

⁵The share of cobalt in ores determines the weight value ratio, and if this ratio is too low, ASM is not feasible

⁶During colonial rule, industrial cobalt mines operated in the region (Hance et al. 1961).



Figure 3.4.1: Satellite image of the Musonoi mines and the city of Kolwezi. The blue dots mark five large-scale mining pits that extract cobalt, including the Katanga pit displayed in Figure 3.2(a). The red dots mark cobalt processing plants. The grey areas mark ASM licenses.

the DRC government can reward local militias that are its allies with mining licenses, which lowers their costs of exporting T3 minerals from mines they control. The Rwandan central government can increase its influence in the Kivu province by providing local militias such as the M23 access to T3 exports via Rwanda. This implies that, since DFA, ASM operations that do not have access to a formal license have become increasingly dependent on informal channels to export T3.

3.5 Measurement and Data: Mining activities and their legal status

This section outlines the methodology used to measure the effects of property rights on resource extraction in ten low-income countries, as outlined in section 3.2. To identify the causal relationship between the economic value of mines and property rights on conflict, two types of mining measures are needed: the location of relevant mining sites and the legal documentation of each site over time. To identify the location of economically important industrial mines, existing studies use proprietary datasets, but these ignore informal mines that may contribute significantly to a country's production capacities. Recent studies leverage geological characteristics to identify areas suitable for ASM (Girard et al. 2022; Rigterink et al. 2023), but do not localize unique mining sites or consider factors such as market access or labor availability in their measurement of ASM. This paper introduces a new approach to observing both mining activities and their legal status over time.

To measure the level of local conflicts, data from the Armed Conflict Location and Event Data Project (ACLED) (Raleigh et al. 2010) is used to measure of local conflict events. While ACLED has been criticized for underreporting (Van der Windt and Humphreys 2016) and imprecise geolocation (Eck 2012), it remains the most granular repository of data on expropriation- and conflict events, including , protests, and battles in Africa. König et al. (2017) show that their empirical findings on conflict in the DRC using ACLED data are still robust when they use the UCDP Georeferenced Event

Dataset (Sundberg and Melander 2013) as outcome variable, which covers significantly fewer events.

*

Actual mining activities To identify formal and informal mining sites, the Minerals Yearbook, volume III, published by the National Minerals Information Center at the United States Geological Survey (USGS), enables a first step. This publication provides a comprehensive overview of mineral resources available in each country, including their geological and geographical characteristics, production and trade statistics, and information on exploration and development activities. Individual formal mining sites are located, while ASM sites for specific commodities are aggregated on the district (adm2) or province level (adm1). To locate ASM sites more precisely, Yearbook data was linked with data from country-level datasets that list the locations of unique ASM mines. To observe the performance and ownership structures of mines, the data was also linked to three proprietary databases: Eikon Energy Screener, fDi markets, and Orbis. This approach significantly increased the sample size: a total of 4270 unique ASM and 235 unique LSM in the ten countries of interest. Figure 3.2(a) plots a single grid cell where LSM operates, while figure 3.1(b) plots two grid cells with ASM. Figure 3.3(a) plots the entire sample of mining activities. These data mapping efforts substantially expand the sample of observed mining activities. For instance, S & P Mines and Minerals, a commonly used resource for industrial mining activities, identifies only 82 unique mines in the DRC and its neighboring countries. I identified nearly triple this number. To my knowledge, no large-n study observes ASM activities on a unique asset level. Appendix 3.B.2 further disaggregates the comparison to S& P Mines, as documented by H. Christensen et al. (2022). The appendix also compares the sample to a USGS dataset from 2005, which Dreher et al. (2016) use to geolocate mining activities.

*

Legal status of mines To identify where property rights for mining activities have been

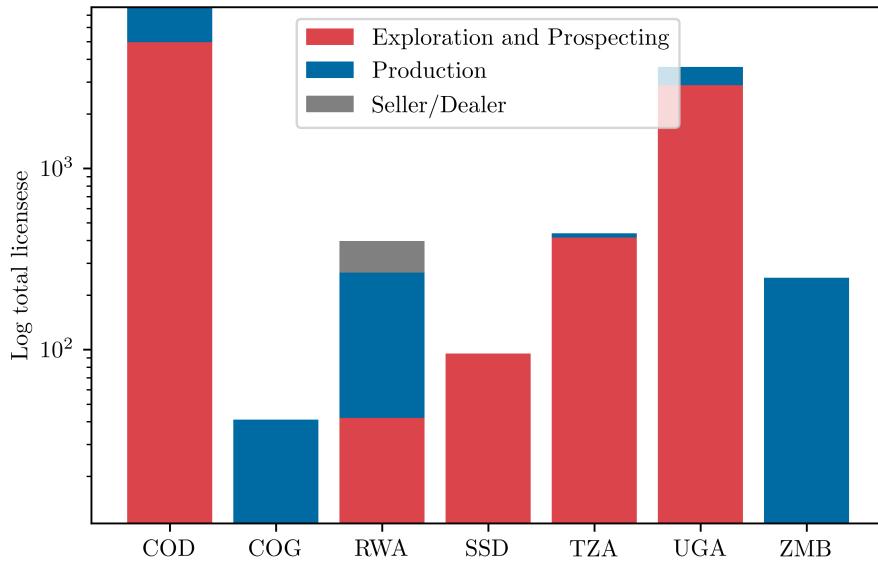


Figure 3.5.1: Total number of mining licenses per country with an online cadastre.
Source: Author's estimates from analysis of national cadastres

defined, the mining cadastres of each country were parsed. Seven out of ten countries affected by the DFA publish their entire mining cadastres online. While these portals are public, the underlying data is unstructured and bulk download is not possible. To overcome this constraint, the Python framework Memorious was leveraged to scrape each mining portal. Even though the first mining cadastres went online in 2008, each portal also includes prior documentation of licenses in analog mining cadastres. This approach provides all formally-mined licenses since independence for each country. The exact legal definition and rights of each license type depends on the national judicial framework. Figure 3.5.1 plots the total number of each license type per country. Whether and how a country documents ownership structures over its mines is subject to its institutions and economic dependence. The analysis discusses selection into treatment in detail. Map 3.2(a) plots the location of mining activities for a single grid cell, while map 3.3(b) plots the locations of all mining licenses in the sample.



(a) Location of unique production sides on grid cell. (b) Location of licenses. In total intersect 17 unique licenses with the grid sell. Source: See main text
 Source: Esri World Imagery

Figure 3.5.2: Production sites, mining licenses and satellite image of a single 5 km^2 grid cell with LSM. The displayed mines are called Katanga KOV Mine and Katanga KTO and extract copper and cobalt in the DRC. Katanga KOV produced 13.48 thousand tons in 2022 and is one of the world's largest cobalt mines. Both mines are run by the Kamoto Copper Company which is owned by the Swiss multinational Glencore (75%) and the state-owned Gécamines (25%) source. The awarded mining licenses in the cell are owned by four different entities and granted for the period 2002-2027. The first application for a license in this cell was filed in 1999.

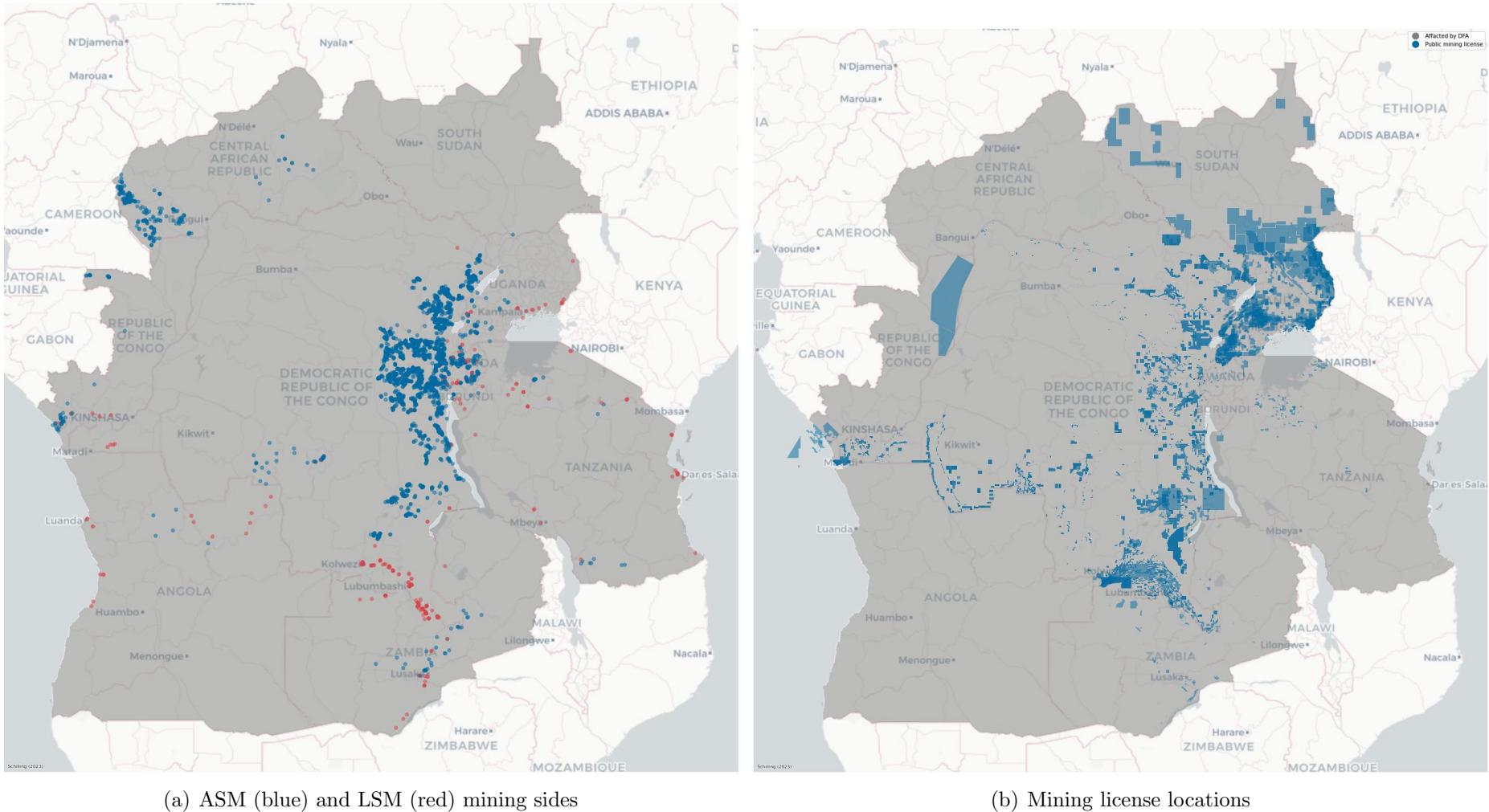


Figure 3.5.3: Location of artisanal or small-scale mining and large-scale mining (LSM) sites as well as mining licenses. The dark grey areas mark the territory of countries that are affected by Dodd-Frank Act section 1502 after 2010. Angola and the Central African Republic do not have mining registers that are available online. Burundi published only a static repository of mining licenses in 2014.

3.6 Identification

As outlined in Figure 3.2.1, the empirical strategy aims to determine the conditions under which mining licenses moderate the relation between price shocks and local conflict levels. The identification strategy relies on the comparison of $5km^2$ grid cells with various types of mining activities and licenses. This section details variations in variables of interest (see Table 3.6.1) that occur across space, time, license-awarding institution, extracted commodity, and production scale. Assessment of these variations facilitates consideration of the economic and legal heterogeneity of mining activities in the DRC and neighboring countries. While this rich data allows to separate each mine's legal status from its economic characteristics, it makes the identification strategy somewhat complex. The primary focus of this identification approach involves a Difference-in-Difference estimation of the linear probability that a conflict event occurs in a grid cell in a given year. I distinguish between the legal, economic, and production characteristics of mines to delve into the marginal effects of formalization.

First, I leverage variation in world market prices for each commodity which are plausibility exogenous to the mines operating in the sample and compare mining licenses that are increasingly useful for exports after 2010 due to the DFA. Additionally, I distinguish between ASM and LSM mining, as these mines extract commodities at different scales. This paper also replicates the well-established finding that the increasing economic value of lootable minerals causes higher conflict levels (Berman et al. 2017; Blair et al. 2021), in greater detail than had been possible in studies that rely on less granular measurement of mining production sides and commodity prices. Additionally, I address potential observational selection issues. These could be caused by confounding factors that determine both a regime's decision to award mining licenses to miners in a grid cell as well as the local conflict levels.

*

Observational selection

In case only certain regimes award mining licenses, the present analysis builds upon a

pre-selection into treatment. For instance, if only democratic regimes formalize their mining sector, changing conflict levels could be confounded by the effects of democratization rather than the licenses themselves. Since the DFA affected ten countries, the number of observations is too small for a reasonably quantitative finding of what determines country's decision to formalize its mining sector. Instead, I compare country-level descriptive statistics to explore the role of political and economic institutions. This includes political variables such as corruption, as well as export statistics of T3 and other minerals.

To observe institutional characteristics, I leverage the V-Dem score (Lindberg et al. 2014) for deliberative democracy, which focuses on how decisions are reached in a polity. Additionally, I consider the V-dem scores of political corruption, which includes measures of six distinct types of corruption that cover executive, legislative and judicial corruption at different governance levels. I also consider the sub-measure 'executive corruption,' which asks how routinely members of the executive or their agents grant favors in exchange for illicit activities such as bribes or kickbacks. Like any measure of cross country intuitions, these measures need to be taken with a grain of salt as they face endogeneity issues and can not capture the full complexity of a country's political and social situation. Nevertheless, they display institutional patterns across countries and allow for statistical control over the establishment of mining cadastres.

*

Disaggregate legal status, economic value, and commodity type

To disaggregate each mine's legal status from its economic value, I apply a well-established measure of the economic value of mining activities. This approach leverages variation in world market prices for commodities to observe exogenous variation in the economic value of a mine and is often used in the mineral conflict literature. This assumption might be called into question, particularly when it comes to cobalt extraction, where the DRC provides up to 89% of the annual world supply. To validate the assumption that prices are indeed exogenous to the countries of interest, Appendix 3.A examines the market power each commodity holds. To estimate commodity prices as accurately as

possible, I consider the modal price ratio between value and weight of trade flows in the BACI trade statistics dataset (Gaulier and Zignago 2010). Compared to existing measures, this time series spans a larger time period. To validate this price measure, Appendix 3.B.1 compares this measure to prices in the spot market data from Bloomberg. Based on this comparison, I conclude that the BACI calculated price index provides the most comprehensive measure over time and correlates strongly with other, less comprehensive measures. Even though the global demand for cobalt has increased 26-fold since 2000, the world market prices of cobalt did not outperform other commodities, suggesting that even the DRC does not have enough political power to leverage its theoretical monopoly of the global cobalt supply.

While existing research estimates the economic value of each grid cell based on the modal extracted commodity, I consider the sum of T3, cobalt and copper (2C), gold, and diamond production for each cell. This approach allows for a more granular comparison of cells and distinguishes the value of property rights over different commodity types. Furthermore, this measure accounts for geological clustering, which is important as many commodities are extracted at the same mine⁷. I compare T3 licenses to other types of mining licenses, i.e., I compare licenses to extract commodities that are regulated by the DFA to licences for commodities that are not.

I distinguish between ASM and LSM as described in the measurement section 3.5 to control for the production scale of each mine. In sum, I derive four variables for economic value: DFA-regulated commodities that are extracted under ASM or LSM, and non-regulated minerals that are extracted under ASM or LSM. The total economic value of mining activities in each cell can be expressed with the following equation:

$$ECON_{it} = \sum_{c=1}^C ASM_c \times \ln(P_{ct}) + LSM_c \times \ln(P_{ct}) \quad (3.1)$$

where ASM_c represents a dummy for an ASM of commodity c . Similarly, LSM_c captures industrial production of commodity c . Next, $\ln(P_{ct})$ captures the log of the world market price for commodity c in year t . DFA-regulated material includes T3 minerals,

⁷Tungsten, tin, and tantalum as well as cobalt and copper are often extracted in the same mine.

Regulation	ASM	LSM
DFA	1589	24
non-DFA	2358	251

Table 3.6.1: Number of mines for each production type considered in the baseline regression. For each of these production sides I examine whether active mining licenses moderate the relation between the economic value of a mine and local conflict levels.

where c is tin, tungsten, or tantalum. To examine the relation between resource extraction, property rights and conflict across mining for different minerals, I group the economic value of mining activities for each cell in two dimensions: 1) ASM - LSM 2) DFA regulated - nonregulated minerals. For each category, I consider the sum of each mining type operating within the boundaries of the cell and define a dummy for each category, if at least one mine is operating. Table 3.6.1 summarizes the number of mines for the four production types in a 2×2 matrix.

*

Estimation

Based on these considerations, I next examined how publicly documented property rights moderate the effects of mining activities on local conflict levels. I placed the proxy of economic mining value in each cell in interaction with a dummy variable that indicates whether the mine's territory lies within the scope of an active mining production license. Equation 3.2 expresses this relation:

$$P(CONFLICT)_{it} = \Gamma_i + \beta_1 Prod_{it} + \beta_2 Prod_{it} \times ECON_{itm} + \beta_3 ECON_{itm} + \omega_t + \epsilon_{it} \quad (3.2)$$

Where $Prod_{it}$ represents a dummy for any active mining license at cell i in year t . To account for spatial autocorrelation, I cluster the standard errors for both regressions using Conley (1999) and control for cell fixed effects Γ_i and year fixed effects ω_t . As each mining license's start and end dates are documented, each license treatment remains active until the license expires.

3.7 Results

As outlined in the identification section, I present two sets of results. First, I present descriptive statistics about the mining and country characteristics to explore which factors determine the establishment of a mining cadastre. Next, I examine the effects of mining licenses on the relationship between commodity price shocks and local conflict.

*

Descriptive statistics

Addressing the threat of observational selection, Table 3.7.1 displays the total amount of mining-related FDI, the first year a country received aid commitments related to mineral/mining policy and administrative management in the IATI database, the last year of an aid commitment project in this sector, the V-Dem scores for political and executive corruption, and the V-Dem deliberative democracy score⁸. As outlined in Section 3.6, I examine whether institutional characteristics confound both the decision to award mining licenses and local conflict levels. The table also indicates whether the country publishes a mining cadastre and whether this cadastre changes over time and intersects spatially with at least one mining production site. Additionally, Appendix 3.B.2 plots the annual T3 export for each country.

Combined, the data show a consistent trend. Countries that are affected by the DFA publish a mining register. Countries that do not export T3, including Angola, the Central African Republic, and South Sudan, do not publish a time-variant register. The only exception to this pattern is Burundi, which exports T3 but published only a static list of mining licenses nearly a decade ago. This implies a straightforward selection mechanism for the types of mining licenses observed in this study: If a country exports T3 and is therefore affected by the DFA, they publish mining licenses online, regardless of domestic institutional characteristics such as political corruption or degree of democratization.

⁸The sources of these data are fDi markets, the IATI database, and Lindberg et al. (2014)

Table 3.7.1: Country characteristics of DFA affected countries

iso3	Mining related FDI (mio. USD)	$\Delta \text{Production license} \cap \text{mine}$							
		Public mining cadastre	Deliberative democracy	Executive corruption	Political corruption	Last mining aid commitment	First mining aid commitment		
AGO	293.1	Never	Never	52.9	69.8	4.5	False	False	
BDI	317.9	2010	2017	57.6	43.1	9.7	True	False	
CAF	0.0	2006	2018	69.1	56.8	8.1	False	False	
COD	9619.0	2002	2022	67.4	78.8	7.2	True	True	
COG	3364.4	2002	2017	79.5	92.7	11.1	True	True	
RWA	318.3	2017	2018	48.4	49.3	8.7	True	True	
SSD	0.0	Never	Never	9.5	9.7	0.7	True	False	
TZA	3366.6	2001	2021	47.8	44.8	16.9	True	True	
UGA	163.6	2003	2014	69.0	61.1	13.1	True	True	
ZMB	9169.9	1995	2022	20.5	20.1	18.6	True	True	

Notes: Descriptive statistics of all countries affected by the Dodd-Frank-Act (DFA) section 1502. Authors' computations from fDi Markets, International Aid Transparency Initiative and V-Dem. See main text for data sources and measuring scale.

*

Regression estimates

Moving on to the relationship between commodity prices and conflict, Figure 3.7.1

shows the regression predictions for changing commodity prices on the probability of local conflict events at the cell level for each of the four mining types, regardless of their legal status. The relation between changing commodity prices and conflict levels is positive across all four types of production sites. Yet, some heterogeneity exists. First, both the distribution and range of economic value proxies vary across the different mining types. This variation originates not only from different commodity price changes but also different location patterns across minerals and production types. For instance, ASM mines often extract all 3T minerals. As the measure considers the mining activities for each commodity type, it aggregates the price changes for each commodity of a production type. The effect size also differs, while all four types of economic activities increase the conflict levels in this linear model significantly at a p-level below 0.01, the coefficients vary from 0.0017 for ASM regulated by the DFA to 0.0044 for non-regulated LSM. The coefficient pattern suggests that price changes in DFA-regulated mines cause smaller increases in conflict levels and that the price-conflict link is stronger for industrial mines.

Next, I considered the role of mining licenses on the relation of interest. Table 3.7.2 reports the baseline results of the analysis. Each column examines the moderating effect of mining licenses on conflict for one of the four mining production types. As outlined in the identification strategy, the analysis separates commodities that need DFA-approved documentation of origin to be exported, i.e., T3, from those that do not. This reveals heterogeneity in the enforcement quality of mining licenses due to external monitoring. The first, fourth, sixth, and eighth rows display the coefficient for the relation between the economic value of each mining type and its local conflict potential. Across three of the four models, an increase in commodity prices corresponds to a significant increase in local conflict levels. Row two lists the coefficient for the direct effect of a mining license on local conflict level for each model. This includes cells that do not contain mining production but are legally covered by an active production license. The remaining rows interact the legal status of a mine with its economic value, distinguishing between DFA and non-DFA commodities as well as ASM and LSM mining. Columns 1) and 2) in table 3.7.2 show the results for commodities that are regulated by the DFA. Column 1) predicts that for

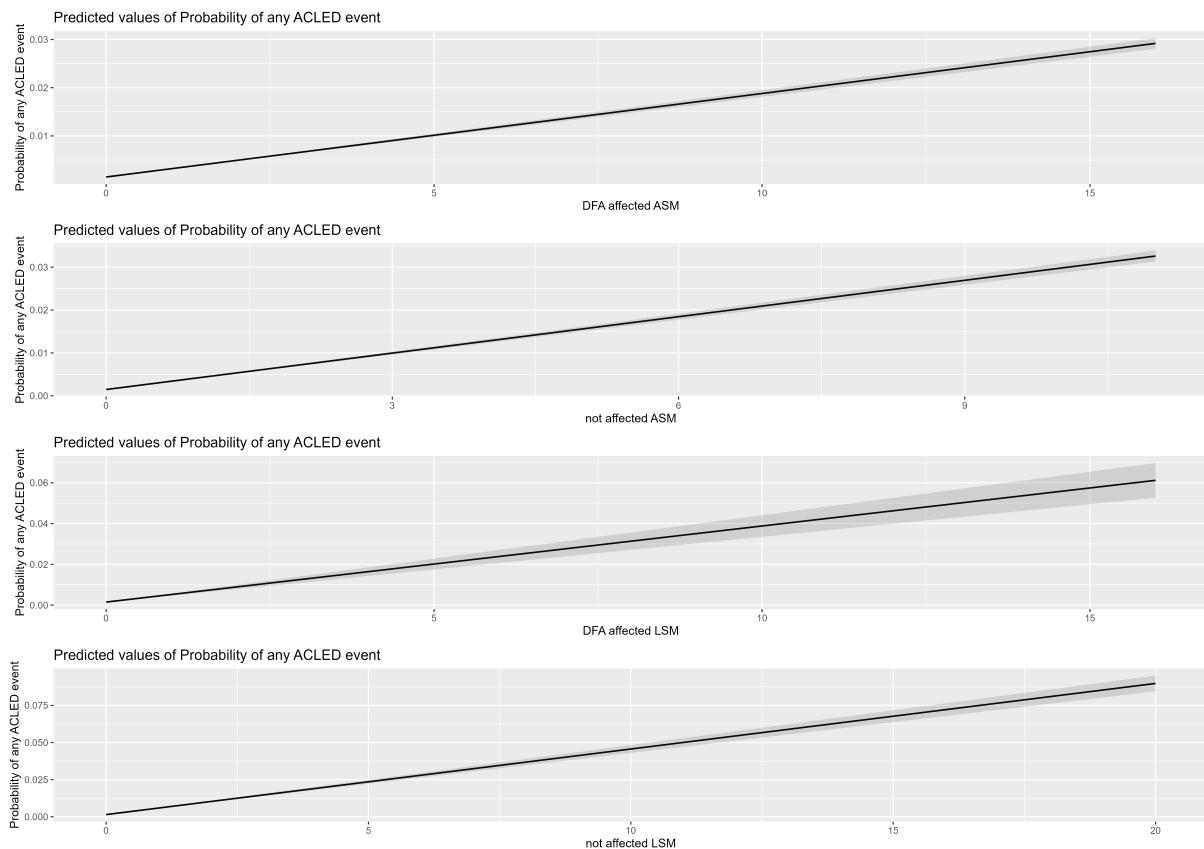


Figure 3.7.1: Linear regression of the log prices of extracted commodity on the probability of local conflict events across the four production types

artisanal T3 mines, a price shock larger than 45% of a standard deviation (SD) causes mines with a mining license to have lower levels of conflict than the same type of mine without a license facing the same price shock. This effect is even larger for mines that extract the same commodity on an LSM scale. For instance, column 2) predicts that for T3 minerals extracted by LSM, a price shock by one SD increases the probability of a conflict event by 0.0480 if the mine has a license. In contrast, the same type of mine without a license faces an increase of 0.0576. While these effects are small in absolute terms, they imply large changes in relative terms.

To present the effects more intuitive in percentages, a price increase of one SD with a license relates to a 1070% lower increase in the probability of conflict events compared to the baseline probability. For price shocks smaller than 45% for ASM or 11% for LSM, column 1) and 2) predict that DFA-regulated mines with a license face a larger probability of conflict events than the same type of mine without a license. Since the coefficients for price changes are larger than the coefficient of the interaction of prices \times licenses, mining licenses will never fully mitigate the negative effect of price change in commodities that are regulated by the DFA in this model.

In contrast, mining licenses for commodities that are not regulated by the DFA do not temper conflict levels. Columns 3) and 4) document the regression estimates for this type of mining. In this specification, a non-DFA-regulated commodity's price increase of one SD is associated with 66% larger probability for a conflict event with a mining license than the same price increase without a license. The probability value in this case lays above on any established significance level.

In sum, these regression results support two main findings. First, the analysis confirms a well-established finding: the economic value of mines and conflict levels in their vicinity are positively related to each other. Using more granular measures of mining sites and commodity prices, this analysis shows that this relationship holds not only among large-scale mines but also smaller, informal mines that prior studies did not consider on an individual level. Second, property rights temper the effect of price shocks on local conflict levels if these rights are actually enforced and monitored. This implies overall

heterogeneous effects of newly established property rights.

The clear utility provided by mining licenses for DFA-regulated minerals is that they reduce the likelihood of local conflict events. This finding holds for both LSM and ASM mines. In contrast, where mining licenses that are not regulated by the DFA do not provide such value. They are associated with higher levels of conflict than mines without ownership documentation.

The underlying mechanism of this heterogeneity is plausibly linked to a mine's dependence on political or bureaucratic entities. Due to property rights gaps, political or economic characteristics of mines mediate the effects of mining licenses on conflict levels. Miners who do not need to document their ownership are less vulnerable to political interference. When due diligence reporting becomes mandatory, miners with formal licenses are better protected from political interference. In contrast, miners without licenses are more dependent on political actors, as they need to find informal channels in order to sell their commodities abroad. In sum, these findings suggest that formalization and the DFA contribute to lower conflict levels for mines with access to property rights but increase conflict levels where license are not monitored by external actors.

3.8 Conclusion

This paper highlights the importance of property rights gaps in the socio-economic utility of property rights, particularly in the context of resource extraction and local conflict. I argue that these gaps hinder efforts to formalize the mining sector in low-income countries and to reduce the level of conflict near the mines.

To test this argument, I introduce two novel data sets of mining activities and their legal status in ten sub-Saharan countries. Using a Difference-in-Difference design, the analysis shows that mining licenses reduce local conflict levels significantly only if their enforcement is monitored by external stakeholders. Global demand that the origin of T3 minerals be documented, initiated by the DFA, demonstrate that external monitoring can prevent some of the political influence over property rights and ensure that mining licenses reduce local conflict levels substantially. But the DFA also establishes new de-

Table 3.7.2: Effect of different mining activities on likelihood for conflict with or without Production license on a cell level 2000-2020. The baseline probability of a conflict event per cell in a given year is 0.00151

Dependent Variable: Model:	P(any ACLED event)			
	(1)	(2)	(3)	(4)
<i>Variables</i>				
DFA ASM	0.0072*** (0.0014)			
License	0.0019*** (0.0007)	0.0017** (0.0007)	0.0014** (0.0006)	0.0016** (0.0007)
DFA ASM × License	-0.0010** (0.0005)			
DFA LSM		0.0159*** (0.0046)		
DFA LSM × License		-0.0046* (0.0024)		
no DFA ASM			0.0037*** (0.0011)	
no DFA ASM × License			0.0006 (0.0011)	
no DFA LSM				0.0046 (0.0029)
no DFA LSM × License				0.0002 (0.0024)
<i>Fixed-effects</i>				
Cell level (333,719)	Yes	Yes	Yes	Yes
Year (21)	Yes	Yes	Yes	Yes
<i>Fit statistics</i>				
R ²	0.23508	0.23501	0.23504	0.23501
Adjusted R ²	0.19683	0.19676	0.19678	0.19676
Observations	7,008,099	7,008,099	7,008,099	7,008,099

Conley (9.2km) standard-errors in parentheses

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

pendencies between miners and political actors, as T3 minerals need some sort of formal documentation prior to export. Miners without access to a mining license face therefore a large threat of political interference.

Can foreign stakeholders effectively oversee mining operations in low-income countries through regulatory mechanisms such as the DFA and mining cadastres? While the implementation of mining cadastres is comparatively cost-efficient, empirical evidence presented in this study underscores the indispensability of external oversight in ensuring the efficacy of mining licenses. It is challenging to provide a precise estimate of the total expenses associated with monitoring the origins of T3 minerals due to the multitude of governmental departments, corporate entities, initiatives, and non-governmental organizations involved in these monitoring endeavors.

Consequently, the findings in this paper call for further research aimed at comprehending the characteristics of mines that undergo formalization. An area of particular interest pertains to the interactions between multinational corporations, which dominate commodity extraction, and political actors in low income countries.

Appendix

3.A Market-power over global commodity

To ensure that commodity prices are exogenous to the actors in the sample, I examine in this section the market power of the DRC for the global cobalt production. If a single country dominates the global supply of a particular commodity, actors in the economy could set the market prices causing of endogeneity. Across the minerals and countries in the sample, the market share of the DRC is by far the largest market share, making it the most likely case of a producer being a price setter in context of this study.

According to the USGS, the country accounts for roughly 70 % of the global market share. Cobalt is crucial for the global supply chain of lithium-ion batteries which face significant demand increase in recent years. In 2018 the government established the national agencia Enterprise Générale du Cobalt (EGC) the formal monopoly to purchase and export cobalt.

However, despite this formal market dominance, the actual market power of DRC remains the defactovery limited. The major share of the fifteen production sides that extraction cobalt in the DRC are owned by Glencore, a multinational cooperation, approximately 30 % of the cobalt is extracted aritsanel. Yet, the no fully independent, economically relevant ASM sides are known . Instead the formal licenses of cobalt ASM are established in close proximity to LSM mining sides. The majority of domestic shareholder in cobalt industry are close to the ex president Kabliba (Deberdt 2021). Despite increasing demand, the global market prices did not increase substantially in recent years.

3.B Further heterogeneity of enforcement

The baseline identification shows that differences in the enforcement quality of mining licenses cause heterogeneity in their effectiveness to reduce conflict levels nearby mines. To examine differences in enforcement among licenses further, I disaggregate the licenses in two additional ways.

To do so, I replicate the baseline regression in Table 3.B.1, but split the sample into two periods: before the DFA became active in 2010 and after. This event did not impose a fully unpredictable event on the affected countries. For instance, the NGO Global Witness published their first report about the social issues of T3 extraction in 2005 (Lipsey 2005), raising awareness among policymakers and corporations. Columns 1) - 4) report the specification as the baseline regression for the post-period 2000-2009, while columns 5) - 8) report these specifications for 2009-2020 after the DFA became active.

This split reflects the main findings of the analysis, but most coefficients become statistically non-significant below a 10 % level. The direct relationship between commodity prices and conflict increased for ASM mines after the DFA became active (comparing column 1) and 5)), while the relationship turned negative for DFA-extracted commodities at an LSM level (column 2) and 5). While the coefficients of the mining licenses are non-significant for both the direct and interaction terms in all eight models, the direction of the coefficients reflects the main findings. After the DFA became active, active mining licenses mitigated the effect of price shocks to a large degree compared to similar mining types that are regulated by the DFA.

Table 3.B.1: Effect of different mining activities on likelihood for conflict with or without Production license on a cell level between 2000 and 2009 (column 1-4) and 2010-2020 (column 4-8).

Dependent Variable:	P(any ACLED event)							
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Variables</i>								
DFA ASM	0.0029** (0.0015)				0.0087** (0.0040)			
License	0.0001 (0.0012)	0.0002 (0.0012)	0.0004 (0.0012)	0.0004 (0.0012)	-0.0002 (0.0009)	-0.0003 (0.0009)	-0.0007 (0.0009)	-0.0009 (0.0009)
DFA ASM × License	-0.0002 (0.0008)				-0.0003 (0.0006)			
DFA LSM		0.0062 (0.0043)				-0.0516** (0.0260)		
DFA LSM × License		-1.19 × 10 ⁻⁵ (0.0001)				-0.0139 (0.0104)		
no DFA ASM			0.0004 (0.0009)				-0.0014 (0.0014)	
no DFA ASM × License			-0.0024 (0.0033)				0.0013 (0.0013)	
no DFA LSM				0.0043* (0.0025)				0.0044 (0.0082)
no DFA LSM × License				-0.0019* (0.0011)				-0.0069 (0.0110)
<i>Fixed-effects</i>								
Cell level (333,719)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Fit statistics</i>								
# Year	10	10	10	10	11	11	11	11
R ²	0.32655	0.32654	0.32654	0.32654	0.30377	0.30377	0.30376	0.30377
Adjusted R ²	0.25172	0.25171	0.25171	0.25171	0.23414	0.23414	0.23413	0.23414
Observations	3,337,190	3,337,190	3,337,190	3,337,190	3,670,909	3,670,909	3,670,909	3,670,909

Conley (9.2km) standard-errors in parentheses

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Table 3.B.2: Production sides per country, comparing my own ASM and LSM measure, to the S &P mines and minerals data and the USGS 20025 Compares USGS 2005 and 2018. USGS 2005 was collected by Dreher et al. (2016)

iso3	asm	lsm	S&P	USG 2005
AGO	5	17	10	13
BDI	58	20	0	9
CAF	225	0	0	0
COD	3365	87	36	0
COG	43	5	0	11
RWA	137	14	0	4
SSD	1	0	0	0
TZA	18	34	12	65
UGA	61	19	1	27
ZMB	34	79	23	113

Mining Licenses and production sides

3.C ASM in northern Kivu

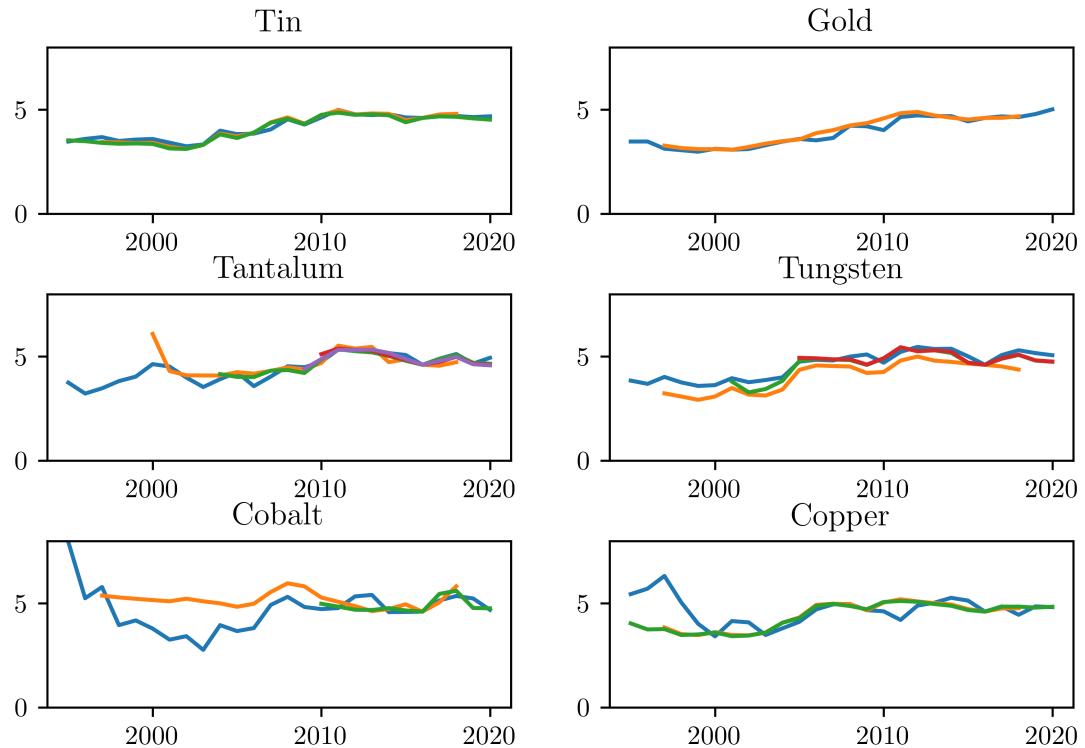


Figure 3.B.1: Commodity prices (\ln , baseyear 2016) over time, comparing prices from Bloomberg (green, red and purple), BACI (blue), and metalary.com (orange). The Bloomberg data consists of the following prices indices: China Tantalum Concentrate Ta 205 30 % CIF, China Tantalum Metal 99.95 % FOB, China Tantalum Metal 99.95% Delivered US, Europe Tungsten APT 88.5 % In warehouse Rotterdam, China Tungsten APT 88.5 % FOB, LME TIN 3MO (\$) UNF Comdty, LME COBALT SPOT (\$) Comdty, LME COPPER SPOT (\$) Comdty. The BACI prices index is the modular ration between quantity and value of all trade-flows per commodity type with at least one trade partner being affected by the DFA per year. Both BACI and metalary.com prices are deflated by prices real to 2016 and normalize by the natural log. This paper uses the BACI commodity prices for the analysis.

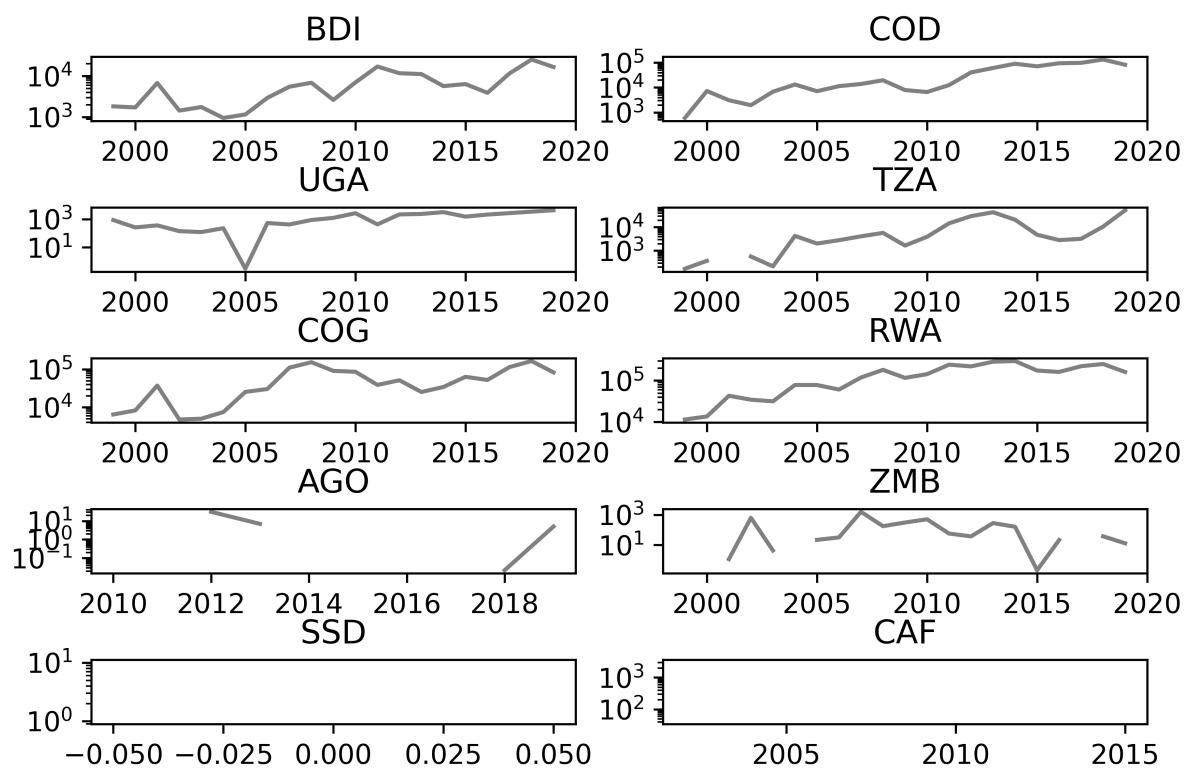
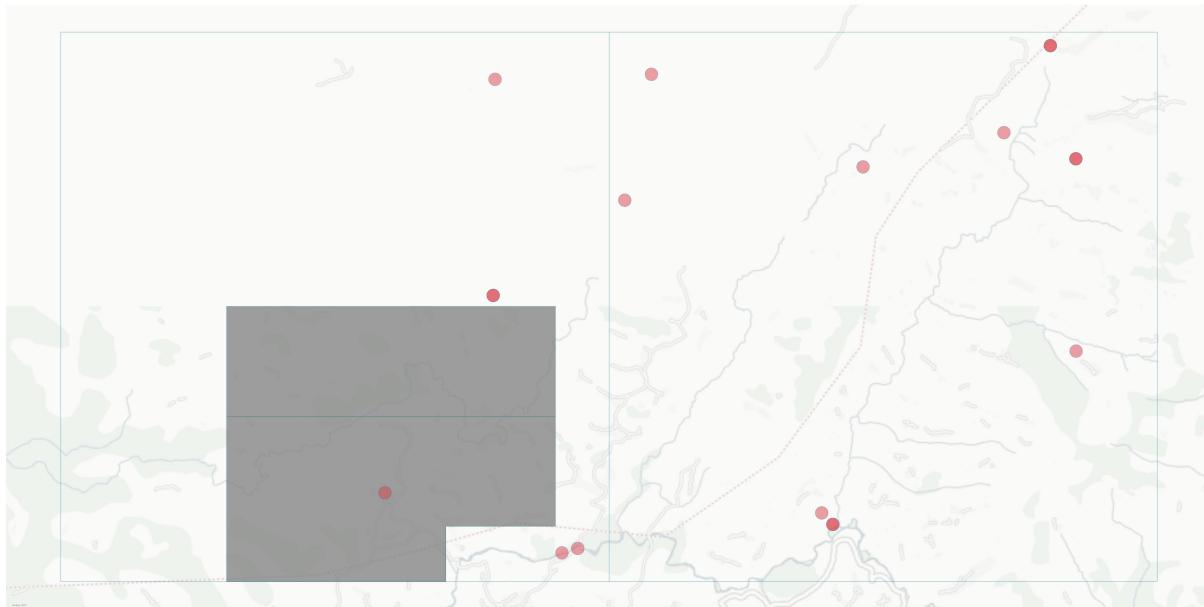


Figure 3.B.2: T3 exports per country 2000-2020 (data source: BACI)



(a) ASM gold and tantalum production, ASM licenses, and boundaries of two 5 km^2 grid cells at the border between North and South Kivu, DRC. The left cell is coded as ASM, regulated by the DFA with a license from 2017, while the right cell is ASM partly regulated by the DFA but without a license.



(b) Satellite image and ASM production spots

Figure 3.C.1: Example ASM production sites that are regulated by the DFA. The two grid cells are located around 90 km from Goma, the capital of the Northern Kivu province.

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