SCUOLA DI DOTTORATO
UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

Department of Economics, Management, and Statistics (DEMS)

Ph.D. program in Economics, Statistics, and Data Science, Cycle XXXVII
Curriculum in Economics

No greater treasure than a true friend? Favoritism in the allocation of official and private flows

Longhi Mattia

Registration number 800271

Supervisor: Prof. Silvia Marchesi

Coordinator: Prof. Matteo Manera

Academic Year 2024/2025

A mio zio Gianni,

per aver sempre stimolato la mia curiosità.

Declarations

Chapter 1 of this thesis is a joint work with Lucas Argentieri Mariani and Silvia Marchesi. Previous versions of the chapter have been presented at the conference of the German Development Association (Leibniz University of Hannover, 2024), the CEfeS conference (ETH Zurich, 2024), the BBQ workshop (Groningen, 2024), the SIEP conference (University of Cagliari, 2024), the Milan Ph.D. workshop (University of Milan-Bicocca, 2024), and the EPCS conference (Stockholm School of Economics, Riga 2025). An earlier version of this work has been circulated as a CefES Working Paper (N. 552).

Chapter 2 is a joint work with Pietro Bomprezzi, Silvia Marchesi, and Rima Turh-Ariss of the International Monetary Fund. Previous versions of the chapter have been presented at the PEIO conference (Harvard University, 2025), the GODAD workshop (Gottingen, 2025) the EPCS conference (Stockholm School of Economics, Riga 2025), the CEfeS conference (University of Milan-Bicocca, 2025), the BBQ workshop (Regensburg, 2025), the Milan Ph.D. workshop (Catholic University of Milan, 2025), and the SIEP conference (University of Naples Federico II, 2025).

Chapter 3 is a junior work co-authored with Caterina Morelli, a Ph.D. colleague. Previous versions of the chapter have been presented at the CEfeS conference (University of Milan-Bicocca, 2025), the BBQ workshop (Regensburg, 2025), the ETSG conference (Milan Polytechnic, 2025), and the IWEEE workshop (Marche Polytechnic University, 2026). An earlier version of this work has been circulated as a DEMS Working Paper (N. 550).

Abstract

The problem of resource scarcity has long driven economists to develop theories aimed at understanding the mechanisms through which limited resources can be distributed to maximize welfare. However, the path toward an optimal allocation may be distorted by various forms of favoritism or strategic behavior, both at the individual and the country level. This thesis is a collection of essays that investigates both "traditional" individual-level forms of favoritism and geoeconomic distortions affecting both official and private flows. First, Chapter 1 uses administrative data to identify mechanisms that offset cabinet members' birth-region favoritism in the allocation of municipal grants, focusing on South Africa as a case study. Chapter 2 examines how economic ties shape the subnational allocation of foreign development aid from Western donor countries to African regions. Finally, Chapter 3 shows how the Chinese panda diplomacy generates a form of international trade favoritism by shaping China's trade preferences toward countries hosting giant pandas.

Contents

Introduction

At the core of economics lies the fundamental issue of how scarce resources are allocated within and across societies. The problem of scarcity has long driven economists to develop theories aimed at understanding the mechanisms through which limited resources can be distributed to maximize welfare. However, the path toward an optimal allocation may be distorted by forms of favoritism or strategic behavior, both at the individual and the country level. Favoritism is defined as the act of offering jobs, contracts, and resources based on group affiliation (Bramoullé and Goyal, 2016), and it often leads to economic inefficiencies.[1] In its political manifestation, it arises when public resources are allocated disproportionately to specific population subgroups, identifiable, for instance, by race, ethnicity, or partisanship (Golden and Min, 2013).[2] At the international level, similar allocative distortions emerge when states selectively direct economic resources in line with strategic and geopolitical considerations. These patterns of resource allocation fall within the scope of geoeconomics, a field that studies how international power dynamics and rivalries shape economic policies and outcomes, and vice versa (Caldera and Iacovello, 2022; Clayton et al., 2025; Mohr and Trebesch, 2025).[3]

Although individual-level forms of favoritism are often informal and rarely openly acknowledged, they are highly visible in practice. For example, the president of Zaire, Mobutu, and the former leader of Sri Lanka, Mahinda Rajapaksa, directed large infrastructure projects—such as stadiums and airports—to their home region (Hodler and Raschky, 2014).[4] By contrast, in relation to geoeconomic distortions, countries have become increasingly explicit in acknowledging their geopolitical

[1] Bramoullé, Y., & Goyal, S. (2016). Favoritism. Journal of Development Economics, 122, 16-27.

[2] Golden, M., & Min, B. (2013). Distributive politics around the world. Annual Review of Political Science, 16(1), 73-99.

[3] Caldara, D., & Iacoviello, M. (2022). Measuring geopolitical risk. American Economic Review, 112(4), 1194-1225.
Clayton, C., Maggiori, M., & Schreger, J. (2025). Putting economics back into geoeconomics (No. w33681). National Bureau of Economic Research.
Mohr, C., & Trebesch, C. (2025). Geoeconomics. Annual Review of Economics, 17.

[4] Hodler, R., & Raschky, P. A. (2014). Regional Favoritism. The Quarterly Journal of Economics, 129(2), 995–1033.

interests and economic objectives. As a result, political alliances and diplomatic relations now play an increasingly prominent role in shaping international economic interactions.[5] The trade war between the United States and China, as well as the renewed geopolitical tension in Europe following the Russian–Ukrainian war, illustrate how access to resources is increasingly influenced by political alignment. Consistent with this development, recent evidence documents a growing fragmentation of international flows along geopolitical lines (Gopinath et al., 2025).[6] As a result, the direction of financial and trade flows across countries can no longer be understood solely through efficiency-based considerations, but must also account for patterns of strategic favoritism embedded in international economic relations.

This thesis examines both domestic, individual-level forms of favoritism and international geoeconomic distortions. It focuses on official flows—such as national government grants (Chapter 1) and foreign development aid (Chapter 2)—as well as private flows, namely international trade (Chapter 3).

This work contributes to the literature on political favoritism and geoeconomics by addressing key gaps in our understanding of how political and strategic considerations shape the allocation of economic resources.[7] First, the literature on favoritism, drawing on subnational data, has documented how national leaders and cabinet members tend to favor their birth regions, ethnic homelands, or electoral districts in the allocation of public funds and development projects. Related research further suggests that such political distortions are likely to be exacerbated during periods of resource windfalls, as fiscal expansions amplify rent-seeking and inefficiencies in public spending. At the same time, the literature on accountability emphasizes that increased media scrutiny, information disclosure, and citizen monitoring can constrain opportunistic behavior by public officials. Despite these insights, much less attention has been devoted to understanding how political favoritism in the allocation of public funds during periods of resource windfall can be mitigated using detailed municipal data. Chapter 1 addresses this gap by exploiting high-resolution data from South Africa to identify mechanisms that offset favoritism in the allocation of municipal grants.

[5] See for example, The Economist (2025). Aid cannot make poor countries rich.

[6] Gopinath, G., Gourinchas, P. O., Presbitero, A. F., & Topalova, P. (2025). Changing global linkages: A new Cold War?. Journal of International Economics, 153, 104042.

[7] A detailed discussion of each chapter's contribution to the relevant strands of the literature, along with the main references, is provided in the introduction of each chapter.

Distortions in the allocation of official funding do not arise solely from the personal or electoral interests of national leaders. As discussed in Mohr and Trebesch (2025), economics and geopolitical interests also play a central role in shaping the distribution of official international flows. Among these flows, foreign development aid has been explicitly recognized by political leaders as a tool to advance their countries' strategic and economic objectives, rather than serving purely humanitarian goals (Financial Times, 2024).[8] Indeed, a large literature on aid allocation shows that geopolitical considerations play a central role in shaping the distribution of foreign development assistance across countries. In relation to this country-level literature, a smaller set of studies points to the relevance of economic considerations—such as trade relationships and commercial interests—in influencing aid flows. In addition, a growing body of research has examined subnational aid allocation, though it has so far focused on a limited set of donors, leaving broader patterns largely unexplored. Despite these contributions, most evidence still relies on country-level data or limited donor samples, leaving open the question of how donor-specific economic ties shape aid allocation at the subnational level. Chapter 2 addresses this gap by examining how economic ties influence the allocation of aid from Western donor countries to African regions.

Beyond official financial flows, a large literature on the political determinants of trade has documented how political relations, diplomatic engagement, and geopolitical alignment also influence international trade. This line of research has also been prominent in studies focusing on China, whose growing integration into the global economy and its challenge to U.S. leadership have attracted considerable scholarly attention. In addition to conventional policy instruments, China has also relied on softer diplomatic practices to signal goodwill and strengthen bilateral ties. Among these practices, China's panda diplomacy has recently attracted particular attention, as giant pandas—a distinctive national symbol—are used by the country as living ambassadors abroad to signal goodwill and foster diplomatic friendship (Financial Times, 2017).[9] While existing work has largely emphasized the political and symbolic dimensions of this practice, its economic implications remain underexplored. Building on this perspective, Chapter 3 examines how panda diplomacy generates a form of international trade favoritism by shaping China's trade preferences toward countries hosting giant pandas.

[8] Financial Times (2024). The EU knows aid is not only a moral duty but a strategic necessity.

[9] Financial Times (2017). Panda politics: the hard truth about China's cuddliest diplomat.

This collection of essays is organized as follows. First, Chapter 1 examines the role of government accountability in mitigating favoritism distortions in the allocation of municipal grants in South Africa. Chapter 2 analyzes whether foreign aid is disproportionally allocated to African regions in which donor countries have strategic economic interests. Finally, Chapter 3 investigates whether the Chinese panda diplomacy generates a form of trade favoritism.

Chapter 1

Political Favoritism under Scrutiny: Capital Inflows, Accountability, and Resource Allocation

Mattia Longhi*, Silvia Marchesi†, Lucas A. Mariani‡

1.1 Introduction

Governments in emerging markets often experience large and sudden capital inflows, driven by commodity price fluctuations, geopolitical shifts, or changes in global financial conditions. While such windfalls can expand fiscal space and enable public investment, they also risk exacerbating political favoritism and inefficient resource allocation, particularly in settings with weak institutional accountability (Acemoglu & Robinson, 2010). Weak institutions not only hinder growth, but also provoke adverse responses to resource booms, driving political redistribution and inefficient capital allocation (Brollo et al., 2013; Caselli & Michaels, 2013; Tornell & Lane, 1999). In democratic settings, however, voters may discipline politicians when corruption becomes salient, withdrawing political support following credible disclosures (Ferraz & Finan, 2008). Informing citizens to strengthen political accountability is therefore crucial, yet causal evidence on its effectiveness remains limited (Armand et al., 2020).

*University of Milan-Bicocca.
†University of Milan-Bicocca and CefES.
‡Bocconi University.

To address this gap, this paper studies how accountability conditions influence the allocation of sovereign capital inflows. Exploiting two quasi-natural events that jointly define the allocation environment in South Africa, we show that heightened corruption salience can alter political responses to fiscal windfalls. When voters are better able to monitor political leaders, sovereign inflows do not expand regional favoritism; instead, they are associated with a reduction in preferential allocations. These findings highlight the central role of voter accountability in shaping the distributional consequences of sovereign inflows.

South Africa provides an ideal setting to examine how public resource allocation responds to variation in corruption salience and voter monitoring capacity. Our first quasi-natural event exploits a sharp increase in corruption salience during President Zuma's administration. In 2011, several multinational firms publicly admitted to paying bribes in connection with the 1999 Arms Deal (BBC, 2011; WSJ, 2011), triggering intense international scrutiny and domestic political pressure. In response, President Zuma established the Seriti Commission to investigate the allegations (BBC, 2011, 2012) and dismissed senior officials implicated in unauthorized expenditures. At the same time, the government introduced a set of transparency measures at the local level, including the Municipal Finance Management Act (MFMA) Circular 56 (2011), which made public a list of "Restricted suppliers" to the public sector and revealed that a high-ranking cabinet member had been blacklisted since 2010 (News24, 2012). Together, these developments substantially increased the visibility of corruption to the electorate, stemming from revelations about a decade-old scandal and occurring in the immediate run-up to a major fiscal expansion.

Around the same period, South Africa experienced a large and externally driven sovereign capital inflow. Our second quasi-natural event is the country's unexpected inclusion in the Citigroup World Government Bond Index (WGBI) in 2012. While South Africa had met the formal eligibility criteria for inclusion since 2009, the precise timing of the announcement was unpredictable and unrelated to contemporaneous economic fundamentals (Argentieri Mariani & Marchesi, 2025). Following the announcement, international investors adjusted their portfolios to replicate the index composition, leading to increased purchases of South African local-currency sovereign bonds and a sharp rise in capital inflows (Broner et al., 2021; Raddatz et al., 2017). This episode provides a clean setting to study how an expansion of fiscal space driven by global financial markets translates into subnational resource allocation. This sequence of events provides a compelling setting to

examine how heightened electoral scrutiny shapes the allocation of public resources during fiscal expansions commonly associated with the political resource curse.[1] Because the two events occur in close succession, we do not attempt to separately identify their individual effects. Instead, we study how sovereign inflows are allocated during a period in which corruption is highly salient and voter monitoring capacity varies across localities.

Together, these two quasi-natural events shape the allocation environment, allowing us to examine how corruption salience conditions the distribution of resources during a sovereign inflow shock. We focus on the allocation of intergovernmental capital grants, asking whether municipalities that are the birthplaces of cabinet members receive preferential treatment when voters' ability to hold politicians accountable is strengthened. To account for dynamic treatment exposure and potential endogeneity, we adopt an approach similar to a stacked difference-in-differences design, using five-year treatment-history fixed effects to compare municipalities with similar recent exposure histories. This strategy shifts identification to within-history variation under parallel trends conditional on past exposure, in the spirit of Imai et al. (2023). Finally, we show that neither the profiles of cabinet members nor the characteristics of their birth municipalities change during this period, reinforcing the interpretation that the observed effects reflect shifts in central government behavior rather than compositional changes.

To conduct this analysis, we exploit a novel dataset that combines granular data on South African municipalities sourced from the South African National Treasury—including revenues, expenses, and corruption measures—with new data on the birthplaces of cabinet members, building on previous work (Asatryan et al., 2023; Widmer & Zurlinden, 2022).[2] Although previous studies have explored regional favoritism by cabinet members, our paper contributes to the literature by examining how, in a context related to the political resource curse (sovereign inflows booms), corruption salience and voters' monitoring can prevent increased political favoritism (Brollo et al., 2013).

Our findings indicate that, prior to these events, the central government systematically favored the

[1] The resource curse, as defined for example by Auty (2002), refers to a decline in income following a resource boom. It becomes "political," as described by Brollo et al. (2013), when resource booms exacerbate political corruption.

[2] Several studies have also examined regional favoritism in advanced economies, focusing on parliamentarians (Carozzi & Repetto, 2016), regional council members (Fiva & Halse, 2016), and state-level cabinet members (Baskaran & Lopes da Fonseca, 2021). In parallel, the U.S. literature has documented how federal spending is targeted to serve re-election incentives (Levitt & Snyder Jr, 1997).

birthplaces of cabinet members. Following the sovereign inflow, however, this disparity declines in areas where corruption salience was higher and voter monitoring capacity was stronger. This pattern is particularly pronounced in birth municipalities with irregular expenditures—spending by local officials that violates applicable laws or regulations and serves as a proxy for local-level corruption—prior to the events, indicating that pre-existing spending practices influenced how the gap evolved. Although informative, this heterogeneity is not our primary mechanism. The strongest evidence arises from differences in educational attainment: preferential allocations diminish in municipalities with more educated electorates—consistent with stronger monitoring capacity—but persist where education levels are lower.

Our analysis further shows that the African National Congress (ANC)—the party that has consistently held power in South Africa since 1994—experienced electoral losses in ministers' birthplaces following the multinational disclosures related to the 1999 Arms Deal. Notably, this pattern emerges only in municipalities that also exhibited prior irregular expenditures, suggesting that historical spending practices shaped how voters reacted to the scandal. These electoral responses were stronger where favoritism voters exhibited higher education, highlighting how variation in monitoring capacity contributed to narrowing the resource gap between birth and non-birth municipalities. Our results remain robust across alternative specifications, and we find no evidence that the shocks distorted other municipal revenue streams, including non-discretionary grants and locally collected taxes.

We next examine whether the reduction in political favoritism affected the provision of public goods and the misuse of public funds. Prior to the inclusion, regional favoritism was associated with modestly higher levels of sanitation services in ministers' birthplaces, with no significant effects on access to water or waste collection. This limited advantage contrasts with the disproportionately large national grants directed to these areas during the same period, suggesting that a substantial share of the additional funding was diverted to irregular expenditures. Consistent with this interpretation, birth municipalities incurred 51% more irregular expenditure than their non-birth counterparts before the shocks. Following the events, irregular expenditures declined markedly in birth municipalities relative to non-birth municipalities. Importantly, although politically motivated grant allocations declined, birth municipalities continued to display higher levels of sanitation service provision than non-birth municipalities, but the gap narrowed in the post-shock period. This suggests

a more efficient use of resources, consistent with the observed decline in irregular expenditures.

This paper contributes to three main streams of literature. The first examines the effects of resource windfalls on public goods provision and economic outcomes. Prior studies show that windfalls often result in less-than-expected increases in public goods and services despite rising revenues (Caselli & Michaels, 2013), or lead to rent-seeking (Baland & Francois, 2000; Tornell & Lane, 1999; Torvik, 2002), inefficient public spending (Robinson et al., 2006), corruption (Brollo et al., 2013; Chen & Kung, 2016; Vicente, 2010), and weakened institutional capacity, ultimately hindering economic growth (Hodler, 2006; Ploeg, 2011; Sachs & Warner, 1999; Torvik, 2002). Notably, much of this literature emphasizes that resource booms tend to amplify rent-seeking especially in contexts characterized by limited institutional capacity (Bhattacharyya & Hodler, 2010; Mehlum et al., 2006).[3] In relation to this literature, our contribution is twofold. First, we document how a fiscal windfall—generated by an external financial shock—translated into changes in the allocation of resources across local governments, particularly in municipalities linked to cabinet members. Second, we show that differences in citizens' capacity to monitor political behavior conditioned how these inflows were distributed, underscoring the importance of accountability in a setting typically linked to the political resource curse. Closest to our work, Armand et al. (2020) investigates the role of information in shaping the political resource curse in Mozambique. To our knowledge, our work is the first study to use administrative data to examine how the revelation of a political scandal interacts with a sovereign capital inflow to shape the allocation of public funds.

Our work also contributes to the literature linking transparency to political behavior and public resource allocation. Previous research shows that greater transparency and monitoring activities can influence accountability outcomes (Armand et al., 2020), reduce corruption (Avis et al., 2018; Bobonis et al., 2016; Brunetti & Weder, 2003; Larreguy et al., 2020), promote pro-poor spending (Banerjee et al., 2024), and influence voter behavior (Chong et al., 2015; Cruz et al., 2024; Ferraz & Finan, 2008).[4] We contribute to this literature by showing that voters reduce support for the ruling party in municipalities of ministers' birth following a corruption scandal, particularly in

[3] In advanced economies, fiscal windfalls have been shown to induce persistent imbalances in local public finances (Berset & Schelker, 2020), while increases in local government revenues are associated with inefficiencies in the provision of public goods (Borge et al., 2015).

[4] In South Africa, De Kadt and Lieberman (2020) document that improvements in service provision can reduce support for the dominant party, potentially due to increased perceptions of corruption.

areas with prior high level of local irregular expenditures. Our main contribution is to show that an exogenous shock—unrelated to contemporaneous corruption—heightened corruption salience and strengthened voter monitoring, which in turn conditioned the extent of preferential funding to politically connected municipalities.

The third strand of literature we contribute to investigates the role of political decision makers in shaping the development of favored regions.[5] Prior work shows that national leaders (Do et al., 2017) or cabinet members (Asatryan et al., 2023; Widmer & Zurlinden, 2022) direct resources toward their birth or ethnic regions (Burgess et al., 2015; De Luca et al., 2018; Dickens, 2018), influencing public goods provision (Burgess et al., 2015; De Luca et al., 2018; Dickens, 2018), economic growth (Hodler & Raschky, 2014), and foreign aid allocation (Bommer et al., 2022; Dreher et al., 2019, 2022).[6] In the case of South Africa, while some papers focus on the role of ethnic favoritism (Amodio & Chiovelli, 2016; Walters et al., 2023), others consider the importance of elections and voter behavior (De Kadt & Larreguy, 2018; Kroth et al., 2016; Obikili, 2019). We contribute to this literature by documenting preferential allocation to the birth municipalities of South African cabinet members and how this shapes the distribution of subnational grants. We then show that the extent of this favoritism varies with corruption salience and voter monitoring capacity after a sovereign inflow. Overall, our results illustrate how political favoritism interacts with heightened scrutiny to shape the allocation of public resources during periods of expanded fiscal space. Taken together, the evidence shows that informational conditions critically determine how international inflows are distributed in contexts commonly linked to the political resource curse.

The remainder of the paper is organized as follows. Section 1.2 outlines the institutional background, and Section 1.3 describes the data and provides descriptive statistics. Section 1.4 explains the empirical strategy and Section 1.5 presents the main findings, including evidence on how variation in corruption salience and voter monitoring capacity shapes the allocation of sovereign inflows. Section 1.6 discusses the implications of reduced allocative discretion. Section 1.7 reports robustness checks and Section 1.8 concludes.

[5] This literature primarily focuses on developing countries, with limited research on hometown favoritism among policymakers in advanced economies (Baskaran & Lopes da Fonseca, 2021; Carozzi & Repetto, 2016; Fiva & Halse, 2016).

[6] More recently, Bomprezzi et al. (2024) investigate the informal influence of political leaders' spouses on subnational development and foreign aid allocation.

1.2 Context and institutional background

The following subsections describe the institutional context of our analysis. We first outline the two quasi-natural events—the corruption scandal and South Africa's inclusion in the WGBI—and then describe the structure of government and the system of municipal finance that govern the allocation of public resources.

1.2.1 Corruption and the 1999 Arms Deal

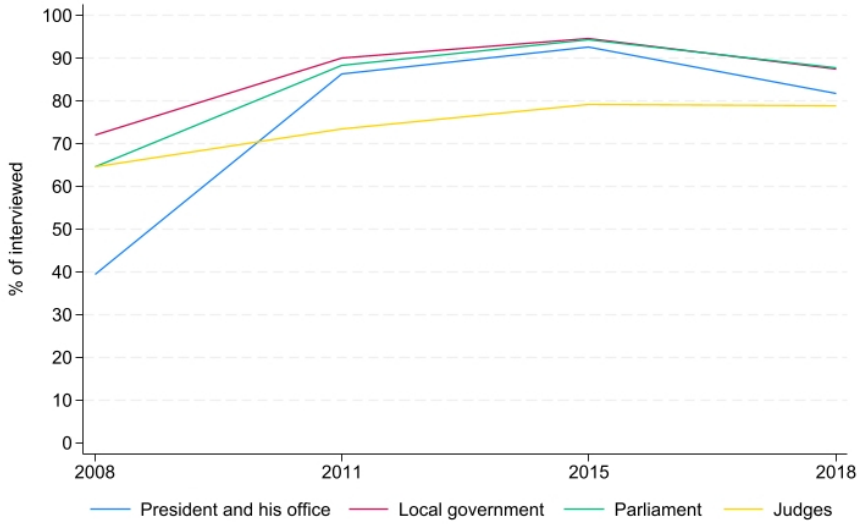
South Africa has long served as a critical case for the study of governance, democracy, and economic development in the post-apartheid era. Since the end of apartheid in 1994, the ANC has maintained a dominant position in national politics within a consolidated democracy and a highly developed fiscal system. Nevertheless, public dissatisfaction with the ruling party has grown steadily, driven by persistent economic challenges such as income stagnation, high unemployment, and deteriorating public services. By 2024, this discontent reached unprecedented levels, culminating in the ANC losing its parliamentary majority for the first time in three decades (The Economist, 2024).

A significant factor contributing to this discontent has been the perception of widespread government corruption, particularly during the presidency of Jacob Zuma (2009-2018). As shown in Figure 1.1, the percentage of Afrobarometer respondents who believed that at least some government officials—including the President—were involved in corruption surged from about 40% in 2008 to 86% in 2011. Figure 1.1 also illustrates that perceptions of corruption in local government (red line) and Parliament (green line)—both largely controlled by the ANC—also increased during this period, albeit at a slower pace. Conversely, perceptions of corruption among judges (yellow line)—an independent branch of government—increased steadily over the years.[7]

The peak in corruption perception closely coincided with public bribery admissions in June 2011 by

[7]The perception of corruption at the national level in South Africa is, on average, much higher than in other African countries. For instance, in the period 2011-2013, the percentage of people who believed that none of the government officials in the office of the President was involved in corruption was about 8.5%, whereas the average across the 33 African countries included in the Afrobarometer survey was about 16.6%. In the same period, even the percentage of people who believed that none of the members of Parliament was involved in corruption was below the African average, registering a value of 6.4% compared with 10.8%. Notably, the percentage of people who believed that neither the office of the President nor members of Parliament were involved in corruption remained below the African average up to the end of our sample. By contrast, prior to the corruption leakage, the same percentage was above the African average.

Figure 1.1: Corruption perception of the powers of the state



Notes: The blue line represents the percentage of people who answered "At least some of them" to the question: "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: The President and Officials in his Office?", over the years. The red line shows responses regarding "Local government," the green line for "Parliament," and the yellow line for "Judges." The data refer to the years 2008, 2011, and 2015. *Source:* Afrobarometer data.

the multinational Saab (Sweden), which also implicated BAE Systems (UK), as well as the publication in August 2011 of an internal report by Ferrostaal (Germany) related to the 1999 South African Arms Deal. These firms had paid multi-million-dollar bribes to secure a lucrative arms contract with the South African government (BBC, 2011; WSJ, 2011). In response to growing pressure, on 24 October 2011, President Zuma established the Seriti Commission to investigate corruption allegations during the 1999 deal and the potential involvement of high-ranking officials in Zuma's cabinet (BBC, 2011). Additionally, on the same day, President Zuma dismissed the Cooperative Governance Minister Sicelo Shiceka (who committed unauthorized spending) and the Public Works Minister Gwen Mahlangu-Nkabinde, and suspended the police chief Bheki Cele (implicated in alleged unlawful property deals) (BBC, 2012).[8]

During this period, the South African government implemented several anti-corruption measures aimed at enhancing transparency and accountability, particularly at the local government level. These measures included stricter budget reporting regulations and the publication of a "Restricted suppliers" list, which identified companies and individuals banned from doing business with the

[8] Bheki Cele was officially fired a few months later, in June 2012.

public sector due to corrupt practices.[9] Notably, the list controversially included high-ranking cabinet member Ayanda Dlodlo, who had been blacklisted since 2010 due to her involvement with a company found guilty of fraud (News24, 2012).

Overall, South Africa provides a compelling case to study the interplay between governance, corruption, and economic policy. The unusual nature of the revelations—whistleblowing by multinational enterprises (MNEs) about a deal concluded more than a decade earlier—creates a rare quasi-natural experimental setting. This episode allows us to examine how information disclosure, by increasing corruption salience and strengthening voter accountability, can mitigate dynamics commonly associated with the political resource curse. Against this backdrop of heightened public scrutiny, South Africa experienced a large and externally driven sovereign capital inflow, which we describe next.

1.2.2 The WGBI inclusion and public inflows windfall

The second quasi-natural experiment we examine provides an ideal setting to study the effects of public resource booms, as it triggered a substantial inflow of capital from foreign investors into a specific asset—namely, government bonds. The event was both unexpected and undetermined by the country's economic fundamentals (Argentieri Mariani & Marchesi, 2025; Broner et al., 2021). On 16 April 2012, Citigroup announced that 11 Southern African sovereign bonds would be eligible for inclusion in the WGBI.[10] Reflecting the surge in foreign demand for these assets, Sienaert (2012) estimates that sovereign inflows ranged from 5 to 9 billion US$ in the days immediately following the announcement, equivalent to up to 10% of total market capitalization. In line with this surge, Broner et al. (2021) and Argentieri Mariani and Marchesi (2025) find a reduction in the cost of government debt, showing sharp declines in the 5-year and 10-year South African government bond yields in the month of the announcement, respectively.[11] Reflecting both the higher demand for sovereign bonds and the lower cost of borrowing, South Africa experienced a sudden increase in public debt inflows. Consistent with this, Figure 1.2 illustrates a sharp increase in foreign portfolio investment following the announcement, with this inflow concentrated exclusively in government

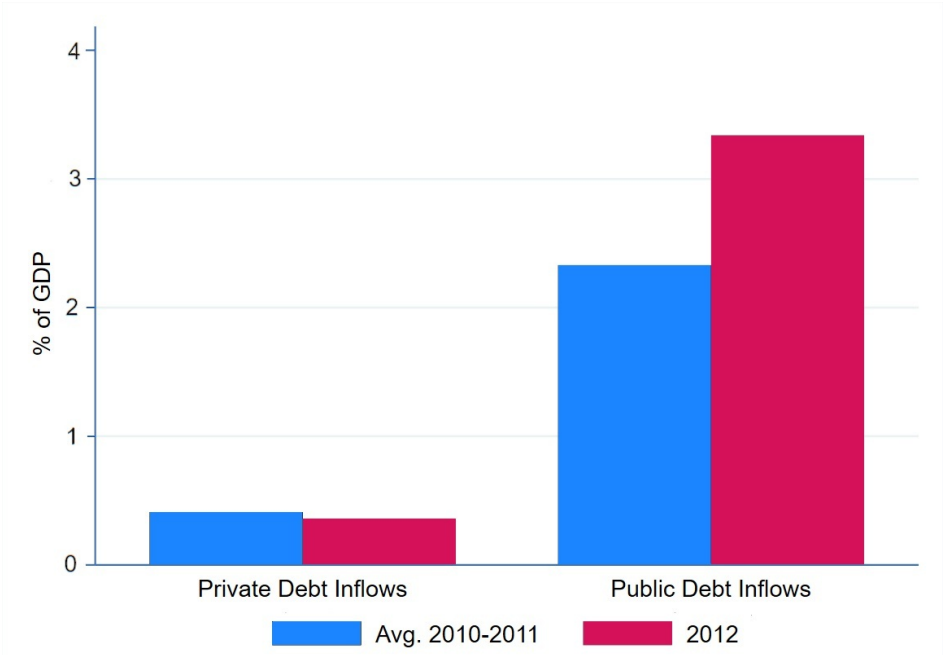
[9] This effort was supported by the introduction of MFMA Circular 56 of 2011, which aimed to strengthen financial oversight and promote greater transparency at the municipal level.

[10] See Broner et al. (2021) for the identification of the exact date.

[11] The authors also show that there was no pre-announcement trend in government bond yields, supporting the identifying assumption that the announcement date was unexpected.

debt. Specifically, in the year immediately following the inclusion, public inflows increased by 1% as a share of GDP. The inclusion therefore generated a significant capital windfall, driven by the change in bondholder composition, as foreign investors increased their holdings of South African sovereign bonds.[12] The importance of this shock is amplified by the nature of the WGBI itself, which exclusively includes sovereign bonds denominated in local currency, thereby influencing domestic financial markets more directly.

Figure 1.2: Balance of payments inflows in South Africa



Notes: The blue bar represents the average of balance of payments inflows as a percentage of GDP in South Africa for the two years before the inclusion in the index. The red bar shows the balance of payments inflows as a percentage of GDP in the year of inclusion. Both bars are reported for private and public debt inflows. *Source:* Argentieri Mariani and Marchesi (2025)

As discussed in Argentieri Mariani and Marchesi (2025), South Africa's inclusion in the WGBI was part of a broader Citigroup strategy to diversify the index's geographic coverage and was not driven by contemporaneous changes in the country's economic fundamentals. At the time, at least six other emerging economies—Chile, China, the Czech Republic, Hong Kong, Israel, and Qatar—also satisfied the eligibility criteria, yet only China was subsequently included, and only in 2021.[13] South

[12] Section 1.3 presents descriptive evidence on the distribution of changes in grant allocations, offering insights into how the shocks propagated at the local level.

[13] For more details, see the IMF Global Debt Database, the IMF Capital Control Database (Fernández et al., 2016), and Fuchs and Gehring (2017).

Africa itself had met all entry requirements since 2009 but was selected only three years later. These criteria included (i) a minimum market capitalization of 50 billion US$, (ii) a credit rating of at least A−/A3 by Standard & Poor's and Moody's, respectively, and (iii) the absence of capital controls. South Africa satisfied these conditions well before inclusion: its sovereign bond market exceeded the capitalization threshold as early as the 1990s, capital controls were lifted with the abolition of the Financial Rand System in 1995 (Molemoeng, 2014), and Moody's assigned a qualifying credit rating from 2009 onward. Consistent with prior evidence that international investors closely track index compositions (Cremers et al., 2016; Pandolfi & Williams, 2019; Raddatz et al., 2017), South Africa's inclusion triggered substantial sovereign debt inflows. Crucially, because these inflows took the form of government debt, they expanded fiscal space without imposing constraints on how resources were allocated, making this episode particularly well suited to study the political economy of public spending.

We next describe the institutional structure of government in South Africa, which shapes how sovereign inflows translate into subnational resource allocation.

1.2.3 Government in South Africa

South Africa has a parliamentary system, with 400 members of the National Assembly elected every five years through a closed party-list proportional representation system.[14] Seats are allocated across ten multi-member constituencies, consisting of one national constituency and nine regional constituencies, with each region corresponding to a province. Members are assigned to seats based on their parties' "national" and "regional" lists, in proportion to the votes each party receives.[15] The governing party is the one that wins the election, obtaining more than 50% of the seats in the National Assembly.[16] Since the end of apartheid in 1994, the governing party in South Africa has always been the ANC.[17] Given that South Africa follows a parliamentary system, rather than a

[14]The national elections relevant to our sample were held in 2004, 2009, and 2014.

[15]Details about the seat allocation process in the National Assembly are provided by the Independent Electoral Commission of South Africa.

[16]The South African Parliament consists of two chambers: the National Assembly and the National Council of Provinces (NCOP). The National Assembly is elected to represent the people, while the NCOP represents the provinces and ensures their interests. However, the NCOP's role in the legislative process is much more limited.

[17]The national election of April 1994 was the first in which all adult South Africans had the right to vote. Under apartheid, only white people were allowed to participate in meaningful political representation, while non-white populations were systematically excluded from political decision-making (Kroth et al., 2016).

presidential one, parties choose their leader before the elections, with citizens effectively voting for the party and, by extension, the leader chosen by that party. According to Section 86(1) of the Constitution of the Republic of South Africa (1996), it is the National Assembly that elects a President from among its members.[18] Once the President is chosen, as outlined in Section 91 of the Constitution, they are responsible for appointing the members of the cabinet, which includes the Deputy President and ministers. All cabinet members must be drawn from the National Assembly.[19] Since members of the National Assembly are elected through parties' "national" and "regional" lists, ministers do not maintain a strong or direct link to a territorial constituency. Consequently, birth-region favoritism may be relatively more prominent, even if it is likely to be less pervasive in absolute terms than in electoral systems based on direct home-region voting. Moreover, ministers are primarily responsible for managing their respective departments (Walters et al., 2023).

South Africa has two other levels of government: provincial and municipal. The municipal government is further divided into three types of municipalities: (i) metropolitan municipalities, which mainly consist of large cities (such as Johannesburg); (ii) district municipalities, which cover larger areas that include multiple local municipalities; and (iii) local municipalities, which are smaller areas that fall within district municipalities. Citizens elect both provincial and municipal councillors. Provincial elections are held every five years, simultaneously with the national elections, where voters elect members of provincial parliaments. Two years later, citizens participate in local government elections to elect members of municipal councils.[20] For local and metropolitan municipalities, voters elect all municipal council members, whereas in district municipalities, citizens elect only 40% of the councillors, with the remaining 60% selected from local councillors designated to represent their areas at the district level.

Administratively, South Africa is divided into 9 provinces, which are further divided into 52 districts: 8 metropolitan municipalities and 44 district municipalities. At a lower level, there are 205 local municipalities, with both local and metropolitan municipalities subdivided into wards. Since local and metropolitan municipalities do not share resources with lower administrative levels and have similar local electoral rules, we treat them as a homogeneous entity. Therefore, we exclude

[18] The President serves as both the Head of State and head of the national executive, as outlined in Section 83(1) of the Constitution.

[19] The President may select no more than two ministers from outside the National Assembly.

[20] Relevant local elections for our analysis occurred in 2006, 2011 and 2016.

district municipalities from the analysis.

1.2.4 Municipal finance

The Constitution establishes the division of responsibilities across different levels of government. The national government is responsible for setting policy initiatives and strategic development goals for both provinces and municipalities. In contrast, the primary role of municipalities is to deliver local services. Section 152 of the Constitution emphasizes that municipalities must ensure the sustainable provision of services to communities while promoting social and economic development. In addition, the "Local Government: Municipal Systems Act" (32 of 2000) outlines the general duties of municipalities, emphasizing that they should prioritize meeting the basic needs of their communities. However, not all services are directly managed by municipalities. For example, water, sanitation, and refuse collection are handled locally, while education, policing, and electrification are managed at the national level. To finance service delivery and their activities more broadly, municipalities can rely on property taxes, service charges, shares of national taxes, grants, and loans.[21] These resources are managed over a financial year that starts on July 1^{st} of year $t-1$ and ends on June 30^{th} of year t.[22] To align with the way municipalities operate, we conduct our analysis using the financial year as the reference period. Since property tax and service charges are collected directly by municipalities, our focus is on grants, which are managed by national departments under the direction of the respective cabinet ministers.

Grants can be classified into operating and capital. Operating grants are intended to finance the daily activities of the municipality, such as providing electricity or paying salaries, while capital grants are used for larger projects, such as infrastructure development. Grants can also be conditional or unconditional. Conditional grants are earmarked for specific types of expenditure, such as the Municipal Infrastructure Grant, which is intended for infrastructure projects. In contrast, unconditional grants are direct financial transfers from the national government with no strings attached. While

[21] As noted by Oosthuizen and Thornhill (2017), Section 229 of the Constitution allows municipalities to generate their own revenue by imposing property rates and surcharges on service fees. However, municipalities do not have the authority to collect income tax, value-added tax, general sales tax, or customs duties. The "Division of Revenue Act" (DoRA) governs the distribution of grants to municipalities. This document is introduced in the National Assembly by the Minister of Finance as the "Division of Revenue Bill," which, once adopted, becomes the DoRA.

[22] The explanatory summary of the "Division of Revenue Bill" is published in the Government Gazette in January or February of financial year $t-1$, indicating that the grants budget is established during the previous financial year.

both capital and operating grants can be conditional or unconditional, capital grants are typically conditional and align with the government's strategic development priorities (Walters et al., 2023).

On the one hand, the most important component of operating grants is the *equitable share*, which is allocated according to a specific formula that is periodically reviewed. This grant typically represents nearly 50% of all government transfers to a municipality when operating and capital grants are considered (Hobdari et al., 2018). The formula takes into account various socioeconomic and demographic factors of each municipality, including the number of households, the proportion of poor households, the unemployment rate, reported property values, total household income, the percentage of households living in tribal areas, and the number of seats in the municipal council. On the other hand, capital grants are only partially determined by a specific allocation rule. On average, about half of total capital grants, primarily consisting of the Municipal Infrastructure Grant, are allocated using a formula that considers poverty levels and the specific functions of the municipality.[23] As a result, capital grants are often described as particularly "political" due to the limited transparency in the process of identifying their recipients (De Kadt & Lieberman, 2020).

For this reason, the paper focuses on the allocation of capital grants, as this is the context in which a given minister—the head of the department responsible for distributing the funds—may exercise some discretion over how grants are allocated. Ministers' discretion is reflected in their ability to influence departmental decisions on the allocation of funds to specific municipalities, as there are no binding constraints limiting the department's discretion in this process. In Section 1.7, we provide evidence that operating grants are not subject to political favoritism exerted by cabinet members. The next section describes the data.

1.3 Data and descriptive evidence

This section describes the data used in the analysis and provides descriptive evidence on municipal finance, political connections, and the allocation of public resources.

[23] Specifically, the formula takes into account factors such as the total number of households, the number of poor households, and the number of poor households lacking access to essential services like water, sanitation, and waste collection.

1.3.1 Municipal finance data

To conduct the analysis, we combine municipal finance data from the South African National Treasury (Municipal Finance Data, 2023) with information on the birth municipalities of cabinet members (Asatryan et al., 2023; Widmer & Zurlinden, 2022) and municipal-level socioeconomic variables from the 2011 Census (Statistics South Africa, 2015). The resulting dataset covers the period from July 2008 to June 2017. Because municipal finance data are reported on a fiscal-year basis, our analysis is conducted at the financial-year level, which runs from July of year $t-1$ to June of year t. For consistency, we refer to each financial year by its ending year; for example, financial year 2009 corresponds to the period from July 2008 to June 2009. Since South Africa's inclusion in the WGBI occurred in April 2012—toward the end of the 2012 financial year—financial year 2013 represents the first full year affected by the inclusion and the subsequent expansion of fiscal space.

The municipal finance data are provided by the South African National Treasury, which collects budgetary and financial documents from municipalities across the country.[24] Information about grants can be retrieved from two different datasets: (i) the "Conditional Grants," (ii) the "Income and Expenditure." The first dataset contains detailed information on both operating and capital grants, but is available only from 2013 onward, thereby excluding the years preceding the shocks. Instead, the "Income and Expenditure" dataset reports both capital and operating grants, details other operating revenues and expenditures, and, most importantly, outlines the criteria used to collect the data. For these reasons, we rely on the "Income and Expenditure" dataset for our main analysis.

The "Income and Expenditure" dataset explicitly distinguishes between unconditional and conditional grants. According to the financial statements of each municipality, "unconditional grants are classified as revenue when the grant is receivable," whereas "conditional grants are classified as revenue to the extent that the municipality has complied with the criteria specified in the agreement." In addition, it is specified that "if conditions are not met, the received funds are repayable."[25] Since capital grants are typically conditional, whereas operating grants are mainly unconditional, capital

[24] The database is accessible at https://municipal data.treasury.gov.za/.

[25] An example of financial statement which clearly identifies the criteria is reported in the Knysna Financial statements for the financial year 2017 and available at: https://www.knysna.gov.za/government/important-documents/financial-statements/.

grants can only be classified as actual disbursements once the municipality has met the required conditions.

All the datasets provided by the South African National Treasury allow for the classification of grants by sector. The 16 available sectors are: budget and treasury office, community and social services, corporate services, electricity, environmental protection, executive and council, health, housing, planning and development, public safety, road transport, sport and recreation, waste management, waste water management, water, and other. Finally, we use data defined as "Audited actual" to ensure the accuracy and reliability of the financial figures used in the analysis.

1.3.2 Birth municipalities

We measure political favoritism using the birth municipalities of South African cabinet members, examining whether municipalities connected to cabinet members receive preferential grant allocations and how this pattern evolves following the two events. Because our analysis focuses on a single country, identification requires within-country variation in political exposure over time. We therefore exploit changes in the number of cabinet members born in each municipality, rather than focusing on the birthplace of the head of government, which would provide little cross-municipality variation. This approach generates meaningful temporal and spatial variation in political connections, allowing us to identify how subnational grant allocations respond to changes in exposure to politically connected elite.

Asatryan et al. (2023) provides a comprehensive analysis of a large set of the governing elite, not just focusing on the primary leader. They manually collect the birthplaces of these elites on a global scale. Specifically, Asatryan et al. (2023) report the name, the date of birth (and death), the period in which ministers were in power, their official position, the party, and various other pieces of information.[26] Using their data, we are able to identify the place of birth and the birth province of each South African cabinet member over the financial years 1967-2017. This information is reported as of July of each year, meaning the data on cabinet members correspond to the beginning of each financial year. Since the original coverage of the dataset for South Africa includes about 80%

[26]The dataset also includes information on the President, the Deputy President, the Governor of the central bank, the Ambassador to the U.S., and the permanent representative to the UN. However, we exclude the latter three since they are not members of the cabinet and are not relevant to the focus of the analysis.

of all cabinet members from 2009 to 2017, we complement their data with information available in Widmer and Zurlinden (2022). These authors report the names, positions, and the months during which South African cabinet members were in power up until the end of 2015, allowing us to slightly expand the coverage of our dataset. Additionally, we manually retrieved information on the birthplaces of three ministers who were not included in the two datasets.[27] In summary, our data covers approximately 93% of all South African cabinet members from the financial years 2009 to 2017, resulting in a total of 298 minister-year pairs out of 322.

Finally, to account for the fact that the same municipality may be the birthplace of multiple ministers, we compute a measure of favoritism intensity. This measure reflects the number of ministers born in the same municipality who are in power at the beginning of each financial year.

1.3.3 Descriptive Evidence

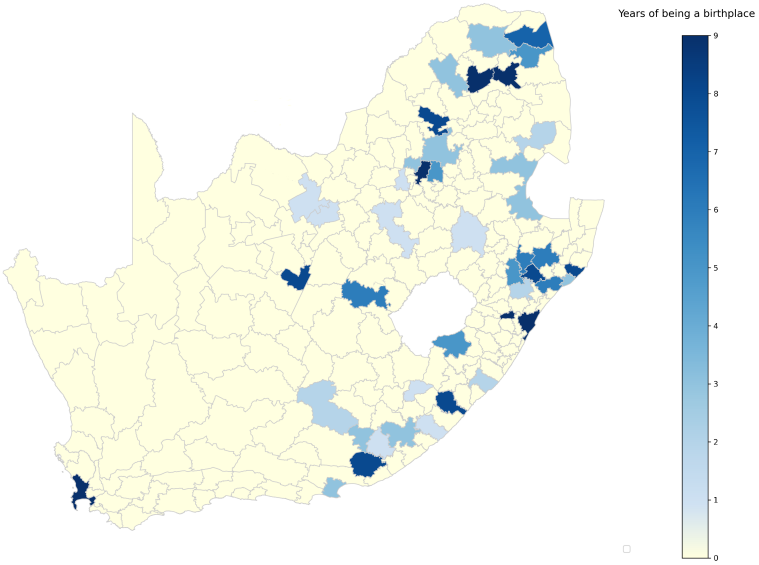
In this subsection, we provide descriptive evidence on how the sovereign debt inflows interact with political favoritism on the provision and allocation of grants. First, Figure 1.3 shows the number of years each municipality served as the birthplace of at least one cabinet member in power during the period from July 2008 to June 2017. Blue areas represent municipalities that have been the birthplace of a cabinet member, with the shade of blue indicating the number of years—ranging from one year (light blue) to nine years (dark blue). Yellow areas indicate municipalities that are not the birthplace of any cabinet member. As can be seen, there is significant variation across space, with lower population density municipalities being less represented, as shown by Figure A1 in Appendix A. In our sample, 43 municipalities have been the birthplace of at least one cabinet member: 36 are local municipalities, and 7 are metropolitan municipalities.

Notably, the local municipalities of Greater Tzaneen, Msunduzi, and Polokwane, as well as the metropolitan municipalities of Cape Town, Ethekwini, and Johannesburg, can consistently be classified as birthplaces throughout the sample period.[28] The number of cabinet members in power at

[27] We also identified two inconsistencies in the recorded birthplaces of ministers, which were incorrectly coded in the original dataset. Specifically, after manually checking all cabinet members, we replaced Minister Sibusiso Bengu with Sibusiso Joel Ndebele for the financial years 2011-2014, and Minister Ayanda Dlodlo with Richard Baloyi for the financial year 2012.

[28] Cabinet members were born in 20 out of the 44 district municipalities as well. Among them, Capricorn, Mopani, and Umgungundlovu can consistently be classified as birth districts throughout the sample period. Regarding provinces, KwaZulu-Natal has the highest number of birth municipalities, while Northern Cape and Western Cape are the provinces

Figure 1.3: Birth municipalities of cabinet members in South Africa, July 2008 - June 2017



Notes: The map shows the number of years each municipality spends being the birthplace of at least one cabinet member in power during the period July 2008 - June 2017. Blue areas represent municipalities that are the birthplace of at least one cabinet member, while yellow areas indicate municipalities that are not the birthplace of any cabinet member during this period. The boundaries reflect the demarcation changes that occurred in May 2011.

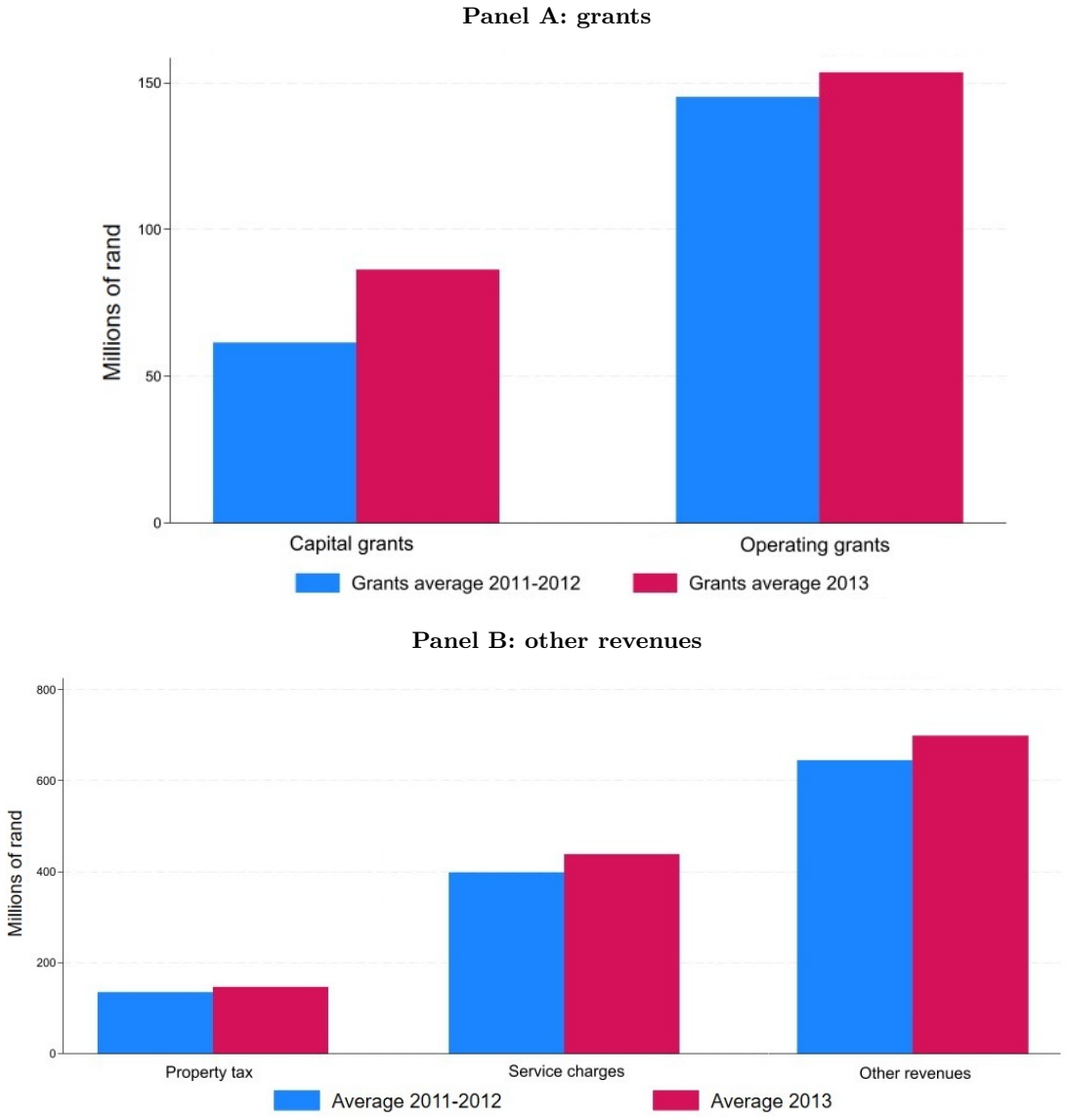
the beginning of each financial year and born in a given municipality is displayed in Figure A2 in Appendix A, highlighting variation across time. While Table A1 reports the number of municipalities that are the birthplace of cabinet members over the sample period for which financial data are available, Table A2 reports the total number of ministers and the number of new ministers for each financial year.[29] Table A3 shows that ministers' characteristics (Panel A) and the characteristics of their birth municipalities (Panel B) remain stable before and after the shocks, suggesting that changes in cabinet composition are unlikely to drive the observed evolution of political favoritism over time.

As a next step, we provide descriptive evidence on changes in municipal revenues around the sovereign debt inflow, focusing on both capital and operating grants. Panel A of Figure 1.4 reports the average real amounts of capital and operating grants, expressed in millions of rand, across all municipalities for the financial years 2011-12 and 2013, corresponding to the periods before and

with only one birth municipality—Sol Plaatje and Cape Town, respectively. However, according to the 2011 Census, the Northern Cape province accounts for only about 2% of South Africa's total population, while the Western Cape accounts for 4%, excluding the municipality of Cape Town.

[29]Ulundi is the only birth municipality that does not report financial data for the year 2017.

Figure 1.4: Municipal revenues in period 2011-12 and 2013



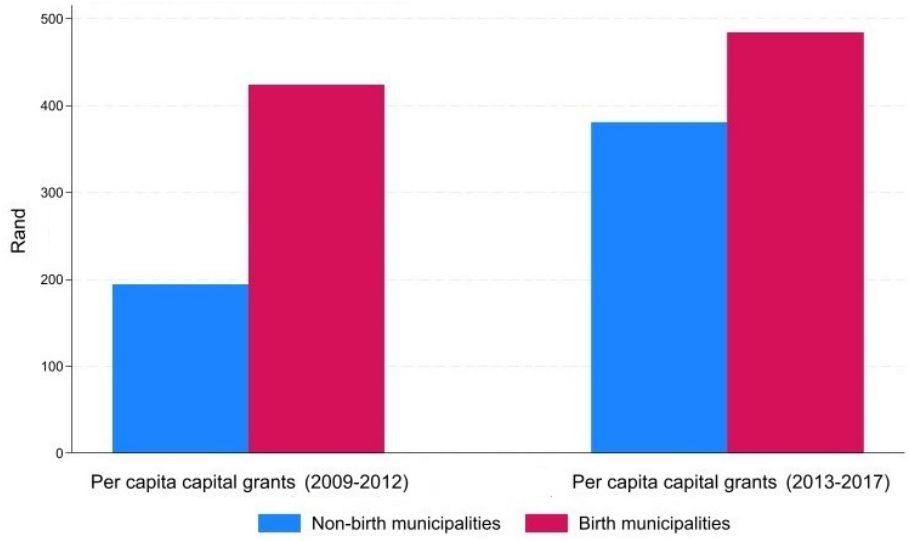
Notes: The blue bar represents the average revenue over the period 2011-12, while the red bar represents the average revenue in 2013. All values are deflated using the consumer price index at the end of the year and expressed in millions of rand.

after the inclusion. Both types of grants are deflated using the consumer price index at year-end. The data show a pronounced increase in capital grants following South Africa's inclusion in the WGBI. Capital grants rose substantially more than operating grants in the post-inclusion period. Specifically, average capital grants increased by approximately 41%, from 61 million rand to 86 million rand, whereas average operating grants grew by only about 6%, from 145 million rand to 154 million rand.

This pattern suggests that the expansion in fiscal space associated with the inclusion was primarily reflected in higher allocations for long-term financing needs. Panel B reports average real amounts of property taxes, service charges, and other own-source revenues, expressed in millions of rand. These revenue sources grew at a rate roughly four times lower than capital grants, consistent with the fact that they are not directly affected by changes in central government financing.

Lastly, we examine whether municipalities associated with cabinet members receive higher levels of capital grants and whether the gap between birth and non-birth municipalities changed following the inclusion. Figure 1.5 plots the total real per capita amount of capital grants, measured in rand, allocated to municipalities that are and are not the birthplaces of cabinet members.

Figure 1.5: Per capita capital grants before and after the inclusion in birth and non-birth municipalities



Notes: The figure displays total per capita capital grants. The blue bars correspond to grants allocated to non-birth municipalities, while the red bars correspond to grants allocated to birth municipalities. The left panel reports allocations before the inclusion, and the right panel reports allocations afterward. All grant amounts are deflated using the consumer price index at year-end, divided by the municipality's 2011 population, and expressed in rand.

The left panel reports the pre-inclusion period, while the right panel shows the post-inclusion period. Capital grants allocated to birth municipalities are higher than those allocated to non-birth municipalities in both periods; however, the gap between the two narrows substantially over time. Before the inclusion, birth municipalities received approximately 400 rand per capita in capital grants, compared with about 200 rand per capita in non-birth municipalities—nearly twice as much. After the inclusion, per capita capital grants increased to nearly 500 rand in birth municipalities and to almost

400 rand in non-birth municipalities, reducing the ratio to about 1.3. Although both groups experienced an increase in capital grants following the inclusion, the growth rate was markedly higher in non-birth municipalities (96%) than in birth municipalities (14%). Overall, while birth municipalities continued to receive higher per capita capital grants, the additional resources associated with the inclusion were disproportionately allocated to non-birth municipalities.

In summary, the descriptive evidence shows that subnational grants increased following the inclusion, largely driven by a rise in capital grants. It also indicates that the birth municipalities of cabinet members consistently received higher levels of capital grants—arguably the most politically discretionary component—than non-birth municipalities. At the same time, non-birth municipalities appear to have caught up in terms of capital grant allocations in the post-inclusion period, narrowing the gap between the two groups. This pattern provides suggestive descriptive evidence of a reduction in political favoritism. The next section outlines the empirical strategy.

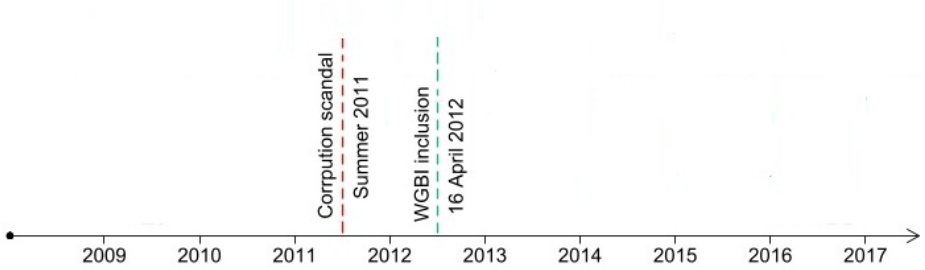
1.4 Empirical strategy

We study South Africa around two quasi-natural events that jointly shape the allocation environment, as illustrated in Figure 1.6. The first event is the 2011 public leak of a major corruption scandal dating back twelve years, which sharply increased corruption awareness. The second is the country's 2012 inclusion in the Citigroup WGBI, which expanded fiscal space through internationally driven sovereign inflows. This section outlines how we examine the effects of these shocks on the allocation of subnational grants between 2009 and 2017. Because the two events occur in close succession, we cannot separately identify their individual effects; instead, we study how sovereign inflows are allocated under different levels of corruption salience to assess how heightened public attention affects political favoritism.

Our event window spans nine fiscal years (three pre-event, one event year, and five post-event years). The dependent variable is the amount of real capital grants allocated to municipality m in sector s in year t.[30] Grants are deflated using the consumer price index calculated at the end of the

[30]To address potential concerns that sector-level disaggregation may mechanically increase the number of observations and inflate statistical significance, in Section 1.7 we report robustness checks based on specifications that do not distinguish grants by sector.

Figure 1.6: Timeline of the shocks



Notes: The schematic depicts the timeline of the two shocks. The red dashed line marks the accountability shock, which occurred in the summer of 2011, while the green dashed line indicates the resource shock, which took place on 16 April 2012.

period (World Development Indicators, 2023). Distinguishing grants by sector allows us to control for both time-invariant characteristics specific to municipality-grant pairs—such as persistent differences in infrastructure needs or administrative capacity—and for time-varying changes in the overall supply of capital grants at the ministerial level. This latter control also captures shifts in ministerial priorities or funding availability that may occur over time, for instance, following the few cabinet reshuffles.

We estimate the extent of regional favoritism in the allocation of subnational grants and examine how it evolves in response to the two key events in our study. Our identification strategy exploits variation over time in ministers' birth regions. By analyzing heterogeneous effects across the event window, we assess how favoritism responds to the sovereign inflow and to heightened corruption salience. Regional favoritism is measured by the number of cabinet ministers born in a given municipality.

Municipalities differ in their intensity of political exposure, defined as the number of cabinet ministers born locally and in office at the start of year t. We treat this as a continuous treatment variable rather than a binary indicator. To account for dynamic exposure and potential endogenous selection into treatment, we employ an approach similar to a stacked difference-in-differences design, using five-year treatment-history fixed effects to stratify municipalities by their exposure histories in the five years preceding t. This design accommodates treatment reversals and a continuous treatment intensity, and follows the history-conditioning rationale of Imai et al. (2023), which conditions on

past treatment histories.[31] The rationale is to purge medium-run differences in pre-trends and endogenous timing. Municipalities that are about to gain or lose a cabinet member may already be on distinct grant allocation trajectories. Conditioning on recent treatment histories therefore aligns treated and comparison municipalities with comparable exposure paths and shifts identification to within-history variation under parallel trends conditional on birthplace-history dynamics. Given the large mass of zeros in the dependent variable, we estimate the following specification using Poisson pseudo-maximum likelihood (PPML):

$$\begin{aligned} Grant_{s,m,t} = exp\{&\beta_0 + \delta_1 Cabinet\_members_{m,t} + \delta_2 Cabinet\_members_{m,t} \times Post_t + \\ &+ \lambda_t \times X_{m,2011} + \alpha_{m,s} + \gamma_{c,t} + \tau_{s,t} + \epsilon_{s,m,t}\} \end{aligned} \tag{1.1}$$

where $Grant_{s,m,t}$ denotes the amount of real capital grants allocated to sector s in municipality m in year t. $Post_t$ is a dummy variable equal to one if $t > 2012$, and 0 otherwise.[32] $Cabinet\_members_{m,t}$ denotes the number of ministers born in municipality m and in power at the beginning of year t.[33] $X_{m,2011}$ is a vector of control variables measured in 2011 and interacted with a non-linear time trend λ_t, to avoid endogeneity issues.[34] $\alpha_{m,s}$ represents municipality-grant-sector effects which absorb time-invariant factors specific to municipality-sector pairs, and $\tau_{s,t}$ denotes the sector-specific time trends to control for time-varying supply of capital grants at the ministerial level. Moreover, $\gamma_{c,t}$ denote municipality-cohort–by–time fixed effects that absorb the birthplace composition history of cohort *c* in the five years preceding *t*. Standard errors are clustered at the municipality level.

Although we compare municipalities with identical five-year cabinet-member histories and show that their observable characteristics remain stable around the shocks (see Table A3 in Appendix A), we further control for the main components of the grant-allocation formula that are expected to influence transfers, interacted with time dummies, following Carozzi and Repetto (2016).[35] We also

[31] In Section 1.7, as a robustness check, we show that the results are similar when excluding treatment-history fixed effects or when shortening the conditioning window to one or three years.

[32] We define $t > 2012$ because the increase in corruption salience began at the start of the 2012 financial year, while the capital inflow windfall occurred at the end of the year.

[33] As a robustness check, we modify the measure of favoritism by considering only the number of ministers with spending authority who were born in municipality *m* and held office at the start of year t.

[34] Fixing controls to their values in the year prior to the shocks helps avoid post-treatment bias, which could arise if time-varying controls were themselves affected by the shocks.

[35] As described in Section 1.2.4, the formula underlying capital grant allocation—such as the Municipal Infrastructure Grant—is based on the total number of households, the number of poor households, and the number of poor households

include a dummy variable equal to one if the national governing party (the ANC) holds a majority in the municipal council of municipality m following the 2011 local elections.[36] This variable accounts for the possibility that the national government allocates more grants to politically aligned municipalities based on the most recent local electoral outcomes preceding the two events.

The coefficients of interest δ_1 and δ_2, capture the extent of preferential allocation both before and after the two shocks. As discussed in the Introduction, both political leaders (Burgess et al., 2015; Dreher et al., 2019; Hodler & Raschky, 2014) and ministers (Asatryan et al., 2023; Widmer & Zurlinden, 2022) often direct resources toward their birth or connected regions. We therefore expect a positive sign of the coefficient δ_1. Because the two shocks occur only one year apart, we cannot separately identify their individual effects. However, the sign of δ_2 provides information on how preferential allocation evolved after the shocks. If the expansion of fiscal space associated with the sovereign inflow dominated, favoritism could increase (Brollo et al., 2013; Tornell & Lane, 1999). Conversely, if heightened corruption salience and greater voter monitoring pressure played a stronger role, favoritism could decline (Bobonis et al., 2016; Ferraz & Finan, 2008, 2011). As a result, the net effect is theoretically ambiguous. Nonetheless, if the corruption salience shock increased voter scrutiny, we would expect a reduction in favoritism following the shocks, implying a negative sign for the coefficient δ_2.

To better understand the mechanism behind the sign of the coefficient δ_2, we exploit heterogeneity across municipalities. A natural alternative explanation is that ministers allocate more resources to their birthplaces because they possess superior local information, enabling more effective use of funds. Under this "local-information" mechanism, favoritism would not be related to corruption or governance weakness: ministers would channel funds to birthplaces regardless of local accountability conditions. If this were true, we would expect preferential allocations to birth municipalities to persist uniformly across governance environments and over time. To assess this possibility, we examine whether municipalities with higher levels of irregular expenditure—our proxy for weak

facing difficulties in accessing basic services, particularly water and sanitation. The components of the formula are specified in the annual "Division of Revenue Bill" of each financial year. While the precise weights have changed over time, these variables have consistently remained central to the allocation formula. Accordingly, in the baseline specification we control for the quartile of the municipal distribution of total households and for the number of poor households, using Census 2011 data. As a robustness check, we also estimate specifications that additionally control for access to basic services.

[36] The municipal election took place on 18 May 2011, near the end of the 2011 financial year. The dummy equals one if the ANC holds more than 50% of council seats in 2011.

local governance, as it represents spending by local officials in contravention of the law—received preferential allocations both before and after the shocks. If politically connected municipalities benefiting from grants were systematically those with weaker governance, this would contradict the local-information interpretation. Moreover, if such municipalities received greater allocations before the shocks but relatively fewer afterward, this would instead be consistent with heightened corruption salience and increased voter monitoring reducing the scope for preferential allocation in weaker-governance areas.

A further mechanism relates to differences in citizens' ability to process information relevant for monitoring political behavior. More educated individuals are generally better able to interpret complex information (Glaeser & Saks, 2006; Persson et al., 2003; Weitz-Shapiro & Winters, 2017), which may strengthen their ability to detect political favoritism when corruption becomes salient. In contrast, populations with lower education levels may have a more limited capacity to process such information. To examine this possibility, we assess whether municipalities with higher shares of highly educated residents experienced a smaller degree of preferential allocation after the two shocks, when corruption salience increased. Importantly, this mechanism does not rely on voters demanding lower transfers to their own municipalities. Rather, when better-informed citizens are able to monitor political discretion more effectively, politicians face greater reputational and electoral risks from channeling disproportionate resources toward favored areas. In this sense, heightened voter scrutiny constrains favoritism, reducing the scope for politically motivated allocations even when they benefit the local constituency. It is important to note that this mechanism is not mutually exclusive with the corruption-heterogeneity channel discussed above; the overall response to the shocks may reflect the interaction between underlying governance weaknesses and differences in citizens' information-processing capacity.

To identify the mechanism driving our results, we define two variables that capture heterogeneity at the municipality level: *Mun Above*, a dummy equal to one if a municipality has a value of the characteristic of interest above the median of the distribution in 2011, and *Mun Below*, a dummy equal to one if it has a value below the median in 2011. Specifically, when examining heterogeneity related to local governance quality, we classify a municipality as "irregular" if it reported irregular expenditure above the median in 2011. Irregular expenditure serves as a proxy for local-level corruption, as it reflects spending by municipal officials that violates applicable laws or regula-

tions.[37] Accordingly, when examining the role of corruption, the variable *Mun Above* equals one if a municipality reported irregular expenditure above the median in 2011, and *Mun Below* otherwise. When focusing on education, *Mun Above* is defined as one if the share of residents aged 20 or older with higher education is above the median in 2011, and *Mun Below* otherwise. Based on these definitions, we estimate the following equation using the PPML estimator:

$$\begin{aligned} Grant_{s,m,t} = exp\{&\beta_0 + \delta_1 Pre_t \times Cabinet\_members_{m,t} \times MunBelow_{m,2011} + \\ &+ \delta_2 Pre_t \times Cabinet\_members_{m,t} \times MunAbove_{m,2011} + \\ &+ \delta_3 Post_t \times Cabinet\_members_{m,t} \times MunBelow_{m,2011} + \\ &+ \delta_4 Post_t \times Cabinet\_members_{m,t} \times MunAbove_{m,2011} + \\ &+ \lambda_t \times X_{m,2011} + \alpha_{m,s} + \gamma_{c,t} + \tau_{s,t} + \epsilon_{s,m,t}\} \end{aligned} \tag{1.2}$$

where *Mun Above* (*Mun Below*) is a dummy indicating whether the municipality has a value of the characteristic of interest above (below) the median, as defined in the previous paragraph. Pre_t equals one if $t \leq 2012$ and zero otherwise, while $Post_t$ equals one if $t > 2012$. The coefficient δ_1 (δ_2) captures the difference in capital grant allocations between birth and non-birth municipalities with lower (higher) levels of the mechanism-relevant characteristic in the period before the shocks. Similarly, the coefficient δ_3 (δ_4) captures the corresponding gap in capital grant allocations after the two events. The control variables are the same as in Equation 1.1, and standard errors are clustered at the municipality level.[38]

Expected post-shock patterns differ depending on the mechanism. Under the corruption heterogeneity channel, heightened corruption salience and voter monitoring should eliminate preferential allocations, implying that neither δ_3 nor δ_4 should be positive. By contrast, under the education-heterogeneity channel, favoritism should persist only in municipalities with lower education levels; thus δ_3 may remain positive, whereas δ_4 should not.

[37] Data on irregular expenditure for the period 2012-2017 are provided by the South African National Treasury (Municipal Finance Data, 2023), while data for 2010 and 2011 were manually collected from the "Audited Financial Statements" of each municipality. Due to limited availability, data for the 2009 financial year could not be recovered.

[38] Since the specification includes a triple interaction term, we also control for the interaction between the *Mun Above* dummy and a non-linear time trend.

1.5 Results

In this section, we present the main results and provide further evidence on the mechanisms driving the reduction in favoritism documented above, with a particular focus on heterogeneity in local corruption and education.

1.5.1 Main results

We begin by examining how patterns of political favoritism in the allocation of capital grants evolved before and after the two shocks, the rise in corruption salience and the sovereign inflow, which together define our post-event period.[39] Across all specifications of Table 1.1, the results show that, during normal times, municipalities that are cabinet members' birthplaces receive significantly larger capital grants, consistent with established evidence of regional favoritism in public resource allocation (Asatryan et al., 2023).[40] After the shocks, however, this advantage disappears. In the preferred specification (column 3), being the birthplace of an additional minister is associated with about 24% higher capital grants prior to the shocks, ceteris paribus, but this association becomes statistically indistinguishable from zero in the post-event period. As shown in the last row of Table 1.1, the combined post-shock effects are never statistically significant, indicating that the gap between birth and non-birth municipalities closes fully after the shocks.

Figure 1.7 presents the dynamic effects of political favoritism over time. In the years preceding the inclusion (indicated by the vertical dashed green line), a persistent and positive gap in favor of birth municipalities is evident. Beginning in 2011, however, this disparity in capital grants between birth and non-birth municipalities steadily declines. This pattern contrasts with findings in earlier work (Brollo et al., 2013; Tornell & Lane, 1999), which typically document increases in preferential allocation during periods of expanding fiscal space (often referred to as resource windfalls). In our context, the reduction in favoritism is consistent with a setting in which corruption becomes more salient and voters face stronger incentives to monitor political behavior, potentially moderating

[39] Table A5 in Appendix A reports summary statistics for the variables used in this specification.

[40] Column 1 includes municipality-grant-sector fixed effects, non-linear time trends interacted with sector-specific dummies, and dummies for municipalities sharing the same treatment history over the previous five years. Column 2 adds the baseline controls described in Section 1.4. Column 3, our preferred specification, further interacts the political alignment dummy with non-linear time trends.

Table 1.1: Favoritism and external shocks in South African municipalities by sector

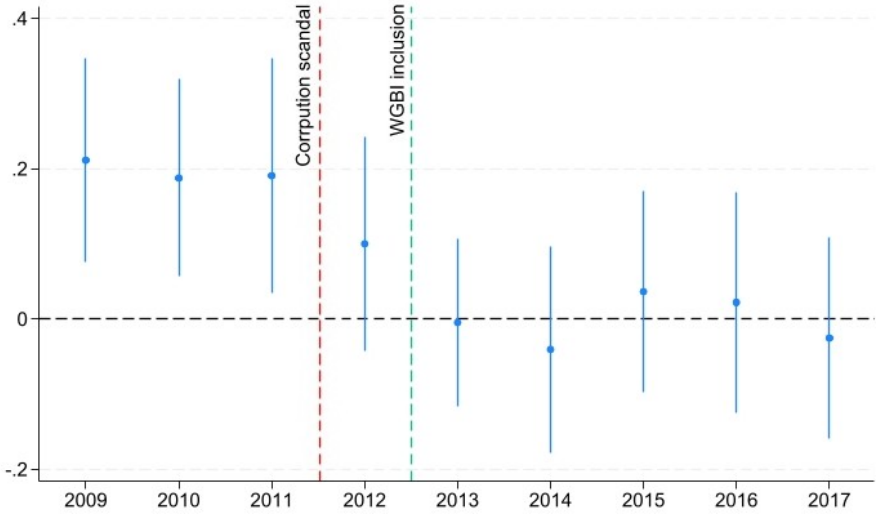
	Capital grants by sector		
	(1)	(2)	(3)
Municipality Cabinet Members	0.172**	0.169**	0.212**
	(0.085)	(0.081)	(0.079)
Post ×	-0.194***	-0.188***	-0.178***
Municipality Cabinet Members	(0.022)	(0.034)	(0.023)
Observations	11,690	11,690	11,690
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes
$\delta_1 + \delta_2$ p-value	0.807	0.807	0.628

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest are "Municipality Cabinet Members," defined as the number of ministers born in a municipality and in office in a given year, and "Post × Municipality Cabinet Members," which interacts this measure with a post indicator equal to one for $t > 2012$. All regressions control for municipality-grant-sector fixed effects, grant-sector-specific non-linear time trends, and fixed effects for municipalities sharing the same treatment history over the previous five years. Column 2 adds municipality-level controls—specifically, the quartile of the distribution of total households and the share of poor households in 2011—each interacted with non-linear time trends. Column 3 further introduces a dummy equal to one if the ANC held a majority of seats in the municipal council following the 2011 local elections, also interacted with a non-linear time trend. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

the extent of preferential allocations (Armand et al., 2020). Interestingly, the figure also shows no clear evidence of statistically significant political favoritism in the financial year immediately following the rise in corruption salience (indicated by the red dashed line), which is consistent with the mechanism suggested in our analysis.

In summary, the findings reveal a marked reduction in political favoritism following the rise in corruption salience and the sovereign inflow. While cabinet members' birth municipalities received more capital grants in earlier years, this advantage dissipated after the shocks. The dynamic analysis provides suggestive evidence that the narrowing of this gap is consistent with the increased visibility of corruption information, which may have strengthened voters' incentives to monitor political behavior. The next subsection provides evidence on the mechanisms behind our results.

Figure 1.7: Cabinet members dynamics effect on capital grants in South African municipalities



Notes: The figure presents the dynamic specification of Table 1.1's column 3. Reported 90% confidence intervals are based on standard errors clustered at the municipality level. The red dashed line marks the shock in accountability, while the green dashed line indicates the shock in resources.

1.5.2 Sovereign Inflows, Corruption Salience, and Political Favoritism

In this subsection, we provide additional evidence on the mechanisms behind the reduction in favoritism documented above, focusing on heterogeneity in local corruption and education. Table 1.2 reports the results from estimating Equation 1.2 when examining differences across municipalities with and without irregular expenditure above the median. If the patterns in Table 1.1 reflect the increased salience of corruption and the resulting incentives for voters to monitor political behavior, we would expect a larger decline in regional favoritism in municipalities that exhibited irregular expenditure above the median prior to the shocks, as these areas may have been more sensitive to the rise in corruption visibility.

The results in Table 1.2, column 3—our preferred specification—are consistent with this interpretation. Favoritism is present in birth municipalities with irregular expenditure above the median in 2011: these municipalities received preferential allocations relative to non-birth municipalities before the shocks. However, this disparity declines after them. By contrast, we find no statistically significant evidence of favoritism for birth municipalities with irregular expenditure below the median, either before or after the shocks. Although the point estimates for municipalities with high irregular expenditure prior to the shocks are somewhat larger in magnitude than those for

Table 1.2: Political favoritism, external shocks and accountability in South African municipalities

	Capital grants by sector			
	(1)	(2)	(3)	(4)
Pre × Mun. Cabinet Members				
× Below Median Irregular Expenditure in 2011	0.290**	0.152	0.169	0.144
	(0.148)	(0.137)	(0.147)	(0.143)
× Above Median Irregular Expenditure in 2011	0.138**	0.128*	0.182**	0.165*
	(0.063)	(0.066)	(0.080)	(0.086)
Post × Mun. Cabinet Members				
× Below Median Irregular Expenditure in 2011	0.159	0.003	0.005	-0.045
	(0.168)	(0.141)	(0.152)	(0.147)
× Above Median Irregular Expenditure in 2011	-0.076	-0.073	-0.005	-0.002
	(0.065)	(0.063)	(0.066)	(0.073)
Observations	11,079	11,079	11,079	9,585
Municipalities x grants sector FE	Yes	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes	Yes
High irregular x year	Yes	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes	Yes
ANC 2011 winner x year			Yes	Yes
Includes 2011 financial year	Yes	Yes	Yes	

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest are triple interactions capturing birth-region favoritism by cabinet members, differentiated by local governance quality and timing relative to the shocks. Specifically, "Pre × Mun. Cabinet Members × Below Median Irregular Expenditure in 2011" captures favoritism before the shocks in municipalities exhibiting lower levels of local-level corruption in 2011, while "Pre × Mun. Cabinet Members × Above Median Irregular Expenditure in 2011" captures the corresponding effect in municipalities with higher corruption levels. The post-shock counterparts—"Post × Mun. Cabinet Members × Below Median Irregular Expenditure in 2011" and "Post × Mun. Cabinet Members × Above Median Irregular Expenditure in 2011"—capture favoritism after the shocks in municipalities with below- and above-median irregular expenditure in 2011, respectively. All regressions include municipality-grant-sector fixed effects, grant-sector-specific non-linear time trends, a non-linear time trend interacted with a dummy indicating whether the municipality's irregular expenditure in 2011 is above the median, and indicators for municipalities sharing the same five-year treatment history. Column 2 additionally includes non-linear time trends interacted with municipal characteristics, namely the municipality's quartile in the distribution of total households in 2011 and the share of poor households in 2011. Column 3 further adds a non-linear time trend interacted with a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011. Column 4 excludes the 2011 financial year. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

municipalities with low irregular expenditure, the difference is relatively small.[41] This motivates further analysis using education heterogeneity, which may provide clearer evidence on the role of information-processing capacity in moderating favoritism.

[41] The findings are robust to excluding the 2011 financial year (column 4), which is omitted to avoid potential biases from using that year's data to define irregular-expenditure heterogeneity.

Table 1.3: Political favoritism, external shocks, accountability and information processing

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members			
× Below Median High Education in 2011	0.441**	0.494**	0.448**
	(0.197)	(0.200)	(0.199)
× Above Median High Education in 2011	0.144*	0.167**	0.209***
	(0.084)	(0.078)	(0.081)
Post × Mun. Cabinet Members			
× Below Median High Education in 2011	0.686***	0.731***	0.751***
	(0.184)	(0.184)	(0.194)
× Above Median High Education in 2011	-0.041	-0.036	0.017
	(0.090)	(0.081)	(0.073)
Observations	11,690	11,690	11,690
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest are triple interactions capturing birth-region favoritism by cabinet members, differentiated by education levels and timing relative to the shocks. Specifically, "Pre × Mun. Cabinet Members × Below Median High Education in 2011" captures favoritism before the shocks in municipalities where the share of highly educated individuals is below the median in 2011, while "Pre × Mun. Cabinet Members × Above Median High Education in 2011" captures the corresponding effect in municipalities above the median in 2011. The post-shock counterparts—"Post × Mun. Cabinet Members × Below Median High Education in 2011" and "Post × Mun. Cabinet Members × Above Median High Education in 2011"—capture favoritism after the shocks in municipalities below and above the median education threshold in 2011, respectively. All regressions include municipality-grant-sector fixed effects, grant-sector-specific non-linear time trends, indicators for municipalities sharing the same five-year treatment history, and a non-linear time trend interacted with a dummy indicating whether the municipality's share of highly educated residents is above the median. Column 2 additionally includes non-linear time trends interacted with municipal characteristics, namely the municipality's quartile in the distribution of total households in 2011 and the share of poor households in 2011. Column 3 further adds a non-linear time trend interacted with a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

To shed further light on the mechanism behind our results, we differentiate across localities based on characteristics that may shape how residents respond to corruption-related information. Prior research suggests that individuals vary in their ability to acquire and process political information, which affects how they interpret signals about government behavior. More educated populations, for example, tend to process complex information more effectively (Glaeser & Saks, 2006; Persson et al., 2003; Weitz-Shapiro & Winters, 2017). If corruption becoming more salient increases citizens' incentives to monitor political behavior, these incentives are likely to be stronger in munic-

ipalities with higher education levels. In such settings, political leaders may face greater scrutiny, potentially limiting the extent of favoritism. Consistent with this interpretation, Table 1.3 shows that municipalities with higher levels of education appear to drive the narrowing of the gap observed in our baseline results. Specifically, while preferential allocations to birth municipalities persist in areas with lower education levels, these patterns are substantially weaker—and no longer statistically significant—in municipalities with higher educational attainment. These findings are consistent with the interpretation that informational conditions—particularly the ability of citizens to process and respond to corruption-related information—play an important role in shaping how favoritism evolves (Ferraz & Finan, 2008; Glaeser & Saks, 2006; Weitz-Shapiro & Winters, 2017). In municipalities with higher education levels, where information processing is likely to be stronger, preferential allocations appear to diminish more markedly. Moreover, the patterns associated with education heterogeneity are clearer than those based on local corruption, suggesting that variation in information-processing capacity provides a more salient source of heterogeneity in our setting.

Table 1.4 then examines whether the rise in corruption salience is associated with changes in voting behavior. The analysis compares municipal election outcomes from 2011—held just before the renewed attention to the Arms Deal—and from 2016, after the scandal had become widely publicized (BBC, 2012). The dependent variable is a binary indicator equal to one if the ANC obtained a majority of votes in the corresponding municipal election.[42] Looking at Panel A, the results indicate that cabinet members' birthplaces were less likely to support the ANC when irregular expenditure had occurred prior to the election, relative to non-birth municipalities without irregular expenditure. These patterns are not present in the 2011 elections, but they emerge clearly in the 2016 election, a period in which corruption involving the central government had become more salient. This timing is consistent with the interpretation that voters in politically connected municipalities responded more strongly to corruption-related information once it became more widely visible (Ferraz & Finan, 2008).[43] Moreover, comparing Panel B and Panel C of this table, we find that the differential

[42]The specification includes municipality fixed effects and a non-linear time trend interacted with municipality characteristics, captured by the quartile of the total household distribution in which the municipality falls and the share of poor households in 2011. We do not include our political control variable here, as it now constitutes the outcome of interest. To account for incumbency, we include a dummy equal to one if the ANC held office in that municipality in the relevant election.

[43]Using Afrobarometer data from the financial years 2009, 2012, and 2016, we explore whether perceptions of corruption evolved differently in birth municipalities after the shocks. Although these data are not representative at the subnational level, they provide suggestive evidence. We estimate a linear probability model (LPM) by OLS in which the dependent variable equals one if the respondent perceives at least one member of a specific branch of government

Table 1.4: Political favoritism, misuse of public resources and electoral accountability

	ANC Municipal Majority		
	(1)	(2)	(3)
Panel A: Full Sample			
Mun. Cabinet Members	0.051	0.056**	0.049
	(0.116)	(0.027)	(0.051)
Mun. Cabinet Members	-0.098*	-0.027	-0.185***
× High Irregular Exp. Before the Election	(0.051)	(0.047)	(0.068)
Observations	264	164	182
Panel B: High Education Sample			
Mun. Cabinet Members	-0.037	0.020	0.042
	(0.133)	(0.016)	(0.055)
Mun. Cabinet Members	-0.115**	-0.030	-0.204***
× High Irregular Exp. Before the Election	(0.051)	(0.025)	(0.069)
Observations	128	81	85
Panel C: Low Education Sample			
Mun. Cabinet Members	0.173	0.405	0.106
	(0.266)	(0.288)	(0.228)
Mun. Cabinet Members	-0.070	0.386	-0.286
× High Irregular Exp. Before the Election	(0.294)	(0.298)	(0.272)
Observations	136	83	97
Municipalities FE	Yes		
Baseline formula controls in 2011 x year	Yes	Yes	Yes
High irregular exp. in 2011 x year	Yes	Yes	Yes
ANC incumbent in 2011 x year	Yes	Yes	Yes
Mun. election years	2011 and 2016	2011	2016

Notes: The dependent variable is a dummy equal to one if the ANC obtained the majority of votes in the municipal election. The variables of interest are "Mun. Cabinet Members," defined as the number of ministers born in a municipality and in office at the time of the election. We also include an interaction between this variable and a dummy equal to one if the municipality reported irregular expenditure above the median in the years preceding the election. All specifications include municipality-level controls interacted with a non-linear time trend, namely: the municipality's quartile position in the 2011 total household distribution, the share of poor households in 2011, a dummy indicating whether the municipality reported irregular expenditure above the median prior to the election, and a dummy equal to one if the ANC held a majority in the municipal council before the election in 2011. Column 1 pools the 2011 and 2016 municipal election years and includes municipality fixed effects. Column 2 restricts the sample to the 2011 election, while column 3 focuses exclusively on the 2016 election. Panel A reports estimates for the full sample of municipalities. Panel B restricts the sample to municipalities with above-median shares of residents aged 20 or older with higher education, while Panel C includes municipalities with education levels below the median. Robust standard errors are reported in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

as corrupt. Because the data are not a panel, we cannot include individual fixed effects. We therefore control for municipality fixed effects; municipal controls interacted with a non-linear time trend, as in Equation 1.1; and individual characteristics following De Kadt and Lieberman (2020). Table A6 in Appendix A shows that perceptions of corruption concerning the President and his office (column 1), the Parliament (column 2), and local governments (column 3)

response in electoral outcomes is statistically significant only in municipalities with higher levels of education. This pattern is consistent with the interpretation that citizens' information-processing capacity and political awareness shape how they react to corruption-related signals (Glaeser & Saks, 2006; Weitz-Shapiro & Winters, 2017).[44] In contrast, we observe very noisy estimates in municipalities with lower education levels, moreover in our preferred specification (column 1) the effects in such municipalities is 40% lower than in municipalities with higher levels of education. These results align with previous findings in South Africa, suggesting that variation in education—and thus in the ability to process political information—plays an important role in how corruption salience translates into changes in electoral behavior (De Kadt & Lieberman, 2020).

In summary, our findings indicate that higher corruption salience can meaningfully alter how fiscal resources are allocated. When corruption becomes more visible, voters appear to have stronger incentives to monitor political behavior, and preferential allocations to politically connected municipalities become less pronounced. This mechanism provides one possible explanation for why the patterns we document differ from those commonly found in settings where increases in fiscal space are associated with heightened rent-seeking (Brollo et al., 2013; Tornell & Lane, 1999). Overall, our results suggest that informational conditions—rather than fiscal conditions alone—play a central role in shaping the distributional consequences of sovereign inflows (Armand et al., 2020). The next section focuses on the consequences of reduced political discretion by examining how the use of public resources evolved after the two shocks.

1.6 The consequences of less discretion

In this section, we examine whether the use of public resources changed after the two shocks, a period characterized by a reduction in the discretionary allocation of capital grants. We first assess whether irregular expenditures declined in birth municipalities following the drop in grant allocations documented in the previous section. We then examine whether this reduction in central government transfers is associated with changes in the provision of local public goods, focusing on

increased relative to non-birth municipalities after corruption became more salient. In contrast, perceptions of the judiciary (column 4), the only politically independent body considered, exhibit no significant differential change between birth and non-birth municipalities.

[44] Municipalities with high education levels are defined as those in which the share of residents aged 20 or older with higher education exceeds the median. Municipalities with low education levels fall below this threshold.

key service delivery outcomes.

Table 1.5: Political favoritism, accountability and misuse of public expenses

	Irregular Exp.	Unauthorised Exp.	Fruitless Exp.
	(1)	(2)	(3)
Municipality Cabinet Members	0.418**	-0.328	0.311
	(0.165)	(0.347)	(0.595)
Post ×	-0.275***	-0.013	0.023
Municipality Cabinet Members	(0.093)	(0.078)	(0.353)
Observations	1,670	1,608	1,657
Municipalities FE	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
Baseline formula controls x year	Yes	Yes	Yes
ANC 2011 winner x year	Yes	Yes	Yes

Notes: The dependent variables are the total real amount of irregular (column 1), unauthorised (column 2), and fruitless (column 3) expenditure done by a municipality in a given year. The variables of interest are "Municipality Cabinet Members," defined as the number of ministers born in a municipality and in office in a given year, and "Post × Municipality Cabinet Members," which interacts this measure with a post indicator equal to one for $t > 2012$. All regressions control for municipality fixed effects, dummies for municipalities sharing the same five-year treatment history, and a non-linear time trend interacted with municipal characteristics. These characteristics include the municipality's quartile position in the 2011 total household distribution, the share of poor households in 2011, and a dummy equal to one if the ANC held a majority of seats in the municipal council following the 2011 local elections. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

First, we examine whether political favoritism is associated with higher levels of irregular expenditure and whether these levels change in the period following the shocks, when favoritism appears to diminish. Column 1 of Table 1.5 shows that municipalities that were the birthplaces of cabinet members exhibit significantly higher irregular expenditures prior to the inclusion, while these expenditures decline in the subsequent years.[45] These findings show that irregular expenditures declined in birth municipalities in the period following the shocks, in line with the observed reduction in discretionary grant allocations. By contrast, we find no statistically significant differences in other measures of public resource use—such as unauthorised expenditures (column 2) or fruitless expenditures (column 3)—between birth and non-birth municipalities, either before or after the sovereign inflow. This absence of effects is not unexpected, as unauthorised and fruitless expenditures do not necessarily entail legal violations. Since irregular expenditures capture clear breaches of expenditure regulations, the pattern is consistent with the interpretation that reduced discretion

[45]The specification includes municipality fixed effects and the controls described in Equation 1.1. Municipality-grant-sector fixed effects and interactions between grant sectors and non-linear time trends are excluded, as irregular expenditures are not defined at the sector level.

in grant allocation was accompanied by improved compliance with spending rules and a decline in politically motivated misuse of public resources.

As a second outcome, we examine whether birth municipalities exhibited better public service provision than non-birth municipalities prior to the shocks, and whether this relative advantage changed following the subsequent decline in discretionary grant allocations. This analysis assesses whether the higher level of discretionary grants received by birth municipalities translated into superior service delivery, and whether the reallocation of grants after the shocks affected this relative position. To measure public goods provision, we focus on access to piped water, adequate sanitation, and waste collection—key service dimensions in the allocation formula of the Municipal Infrastructure Grant (see Section 1.2.4 for details). We use data from the Community Household Survey conducted by (Statistics South Africa, 2008, 2017), which fills gaps between population censuses and provides finer geographic coverage than other household surveys.

We estimate a linear probability model in which the dependent variable is a binary indicator equal to one if the household has access to the relevant service, and zero otherwise.[46] Since the Community Survey is available only for 2007 and 2016, we proxy regional favoritism using the average number of cabinet members originating from a municipality who were in office during the four years preceding each survey round. Our specification includes municipality fixed effects and municipality-level controls interacted with a non-linear time trend, as outlined in Equation 1.1. We also control for time-varying individual characteristics of the household head, following De Kadt and Lieberman (2020).[47]

Table 1.6 reports the relationship between the two shocks and access to piped water, adequate san-

[46] We define access to piped water as a dummy equal to one if the household reports having piped water inside the dwelling, within the yard, or within 200 meters of the dwelling. Access to adequate sanitation is defined as a dummy equal to one if the household reports having a flush toilet, chemical toilet, ventilated pit latrine, or ecological toilet. Access to weekly refuse removal is defined as a dummy equal to one if the household reports that refuse is collected at least once per week. Importantly, this measure does not correspond to the definition of "adequate refuse removal" used in the "Division of Revenue Bill." Properly assessing that standard would require information on whether the household is located in an urban, tribal, or farm area, which is not available in the 2007 survey round.

[47] Specifically, we include a dummy equal to one if the household head is male, along with age and educational attainment. We also control for a dummy indicating whether the head of household is Black South African, a dummy for urban residence, and indicators for whether the household head speaks Zulu or Xhosa. Information on urban residence and home language is available only in the 2016 wave of the Community Survey; for the 2007 round, we impute municipality-level averages of these variables from the 2016 data. Finally, unlike De Kadt and Lieberman (2020), we do not restrict the sample to Black South Africans, but instead include a dummy for Black South African to control for this characteristic.

Table 1.6: Political favoritism, resource windfall and public goods provision

	Piped Water	Adequate Sanitation	Waste Collection
	(1)	(2)	(3)
Avg. Municipality Cabinet Members	-0.006	0.016**	0.012
	(0.007)	(0.006)	(0.010)
Post ×	0.001	0.011***	-0.007
Avg. Municipality Cabinet Members	(0.004)	(0.004)	(0.006)
Observations	1,226,304	1,226,304	1,226,304
R-squared	0.295	0.297	0.506
Municipalities FE	Yes	Yes	Yes
Baseline formula controls in 2011 x period	Yes	Yes	Yes
ANC 2011 winner x period	Yes	Yes	Yes
Household head controls	Yes	Yes	Yes

Notes: The dependent variable is a dummy equal to one if the household has access to piped water (column 1), adequate sanitation (column 2), or refuse removal at least once a week (column 3). The variables of interest are "AVG. Municipality Cabinet Members," that is the average number of cabinet members from a municipality and still in office over the years 2004-2007, and "Post x Municipality Cabinet Members," which interacts the average number of cabinet members from a municipality and still in office over the years 2013-2016 with a post indicator equal to one for $t > 2012$. All regressions control for municipality fixed effects and a non-linear time trend interacted with municipal characteristics. These characteristics include the municipality's quartile position in the 2011 total household distribution, the share of poor households in 2011, and a dummy equal to one if the ANC held a majority of seats in the municipal council following the 2011 local elections. At the household level, we control for the head's sex, age, education level, a dummy indicating whether the head is Black, and indicators for whether the head speaks Zulu or Xhosa and resides in an urban area. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

itation, and weekly refuse removal in municipalities that are cabinet members' birthplaces. The results illustrate how political discretion shaped local public goods provision in ministers' birth municipalities before and after 2012. Despite receiving substantially higher capital grants prior to the shocks, birth municipalities exhibit better outcomes only in terms of access to adequate sanitation (column 2). Specifically, although municipalities associated with an additional cabinet member received roughly 24% more capital grants before the shocks, the probability that a household has access to adequate sanitation is only 1.6% higher, ceteris paribus. By contrast, birth municipalities do not display superior access to piped water or refuse collection relative to non-birth municipalities. Notably, even after discretionary grant allocations decline following the shocks, sanitation outcomes in birth municipalities remain higher relative to non-birth municipalities. These results should not be interpreted as implying that non-birth municipalities failed to experience improvements in sanitation or other services after the reallocation of grants. Rather, the estimates indicate

that birth municipalities continued to enjoy a relative advantage in sanitation outcomes, despite receiving fewer politically motivated transfers.

To further illustrate these relative changes, Figure A3 in Appendix A presents descriptive evidence on changes in access to sanitation before (left panel) and after the shocks (right panel) in both non-birth municipalities (blue bars) and birth municipalities (red bars). We focus on sanitation because it is the only outcome exhibiting statistically significant differences in Table 1.6. In particular, we examine how sanitation access evolved in non-birth municipalities, which experienced a relatively larger increase in capital grants after 2012. As shown in the figure, access to sanitation improves in both birth and non-birth municipalities following the shocks, with the largest gains observed in non-birth municipalities. Nevertheless, birth municipalities continue to display higher sanitation coverage than non-birth municipalities. Overall, this pattern indicates that the sanitation gap between birth and non-birth municipalities narrows in the post-shock period. Consistent with the regression evidence in Table 1.6, regional favoritism by cabinet members does not translate into large improvements in public goods provision in birth municipalities. At the same time, these municipalities do not experience a deterioration in service delivery following the reduction in discretionary grant allocations. Taken together, these findings align with our earlier results showing a decline in irregular expenditures after 2012, suggesting that reduced political discretion curtailed misuse of public resources without adversely affecting basic service provision.

Overall, our results suggest that the reduction in political favoritism by cabinet members is not associated with economically meaningful changes in public goods provision. At the same time, the decline in discretionary grant allocations coincides with a substantial reduction in irregular expenditure and a more equitable distribution of resources across municipalities. The next section presents robustness checks that further assess the stability of these findings.

1.7 Robustness

This section presents a series of robustness checks to assess the validity of our main findings. The corresponding tables and figures are reported in Appendices B-D. We first address potential concerns related to our identification strategy. We then evaluate the robustness of the results using alternative specifications and examine whether our conclusions are sensitive to sample composition.

1.7.1 Identification

Placebo with other sources of revenue

A potential threat to our identification strategy is that the shocks may have affected other municipal revenue sources that are collected directly by municipalities. To address this concern, we conduct a placebo test to assess whether the shocks influenced these alternative revenue streams. Additionally, we examine whether the shocks impacted operating grants—which are less subject to discretionary allocation—as detailed in Section 1.2.4. To do so, we estimate a regression in which the dependent variables are the logarithmic transformations (plus one) of real property tax revenue, service charges, other revenues, and operating grants received by municipality m in year t.[48] The results are reported in Table B1 in Appendix B. Using the same controls as in column 3 of Table 1.1, except for sector fixed effects, we find no evidence that the shocks affected any component of municipal revenue that is not subject to discretionary allocation by cabinet members.[49]

Different cabinet members birthplace historical dynamics

To verify that our results are not driven by the number of years used to construct the groups of municipalities with the same history, we re-estimate the baseline specification using windows of zero, one, and three years. As reported in Tables B2 and B3 in Appendix B, both the baseline estimates and the education-based heterogeneity results remain robust across all alternative definitions.

1.7.2 Alternative specifications

Additional controls

To verify that our findings are not sensitive to model parsimony, Table C1 in Appendix C reports estimates from specifications that incorporate additional controls. Column 1 augments the preferred specification in column 3 of Table 1.1 by including further components of the Municipal Infrastruc-

[48] Other revenues are calculated as the difference between total revenues and the sum of capital and operating grants.

[49] As an additional robustness check, we re-estimate the specification using the inverse hyperbolic sine (IHS) transformation instead of the logarithmic transformation. The IHS transformation preserves the functional form while accommodating zero values, eliminating the need to add one to the data. The results (available upon request) are unchanged.

ture Grant formula, as described in Section 1.4. Specifically, it adds the 2011 shares of households with access to adequate sanitation, piped water, and weekly waste collection. To assess whether municipalities might receive a larger share of grants simply because they were historically more reliant on transfers, column 2 introduces a measure of grant dependence for the 2011 financial year, defined as the ratio of total grants received to total revenue collected, using data from the Municipal Finance dataset. Finally, to account for additional socioeconomic factors that may indirectly influence the allocation of capital grants, column 3 incorporates the controls used in the operating-grant formula. Specifically, we include 2011 values for the unemployment rate, average household income, the share of households residing in tribal areas, and the total number of municipal council seats. Data on council seats are obtained from the Electoral Commission, while the remaining variables come from the 2011 South African Census. Property values are excluded due to data limitations. All controls are interacted with a non-linear time trend. Across all specifications, the baseline results remain stable. As shown in Table C2, these findings also hold when the same set of controls is added to column 3 of Table 1.3.

Ministers' importance

Since not all cabinet members exert the same level of influence over the central government, this section differentiates ministers based on their relative importance. Instead of relying on the classifications used in prior work (Francois et al., 2015; Widmer & Zurlinden, 2022), we categorize ministers according to their spending authority, as defined in the annual "Division of Revenue Bill."[50] We re-estimate Equation 1.1 by redefining $Cabinet\_members_{m,t}$ as the number of cabinet members with spending capacity who were born in municipality m and in office at the beginning of financial year t. As reported in Table C3, the baseline results are unchanged under this alternative definition. Moreover, Table C4 shows that the education-related heterogeneity findings also remain robust.

[50]By focusing on spending capacity, this classification offers a more precise and institutionally grounded way to examine the role of cabinet members in public goods provision. Ministers with spending capacity are those heading departments that administer specific local or provincial grants, giving them formal authority over how these funds are allocated. These ministers may also influence provincial governments to channel resources toward their birthplaces. By contrast, ministers without such authority cannot directly shape spending decisions but may still exert informal influence within the cabinet to redirect resources to their regions. Cabinet members with spending capacity include the ministers responsible for Agriculture, Arts and Culture, Basic and Higher Education, Energy, Finance, Health, Housing (later Human Settlements), Provincial and Local Government (later Cooperative Governance), Sport, Transport, and Water. The Minister of Social Development acquired spending authority in 2016. The President is also classified as having spending capacity, given their role as head of the executive.

Alternative transformation of capital grants data

A potential concern is that differentiating grants by sector mechanically increases the number of observations and may inflate statistical significance. To address this issue, we estimate an alternative specification in which grants are aggregated at the municipality-year level and not differentiated by sector. Specifically, we re-estimate Equation 1.1 excluding the interaction between non-linear time trends and sector dummies.[51] The results are reported in Table C5 in Appendix C. Column 1 includes municipality and year fixed effects, along with dummies for municipalities sharing the same treatment history over the previous five years. Column 2 replaces year fixed effects with non-linear time trends interacted with the baseline controls described in Section 1.4. Column 3, our preferred specification, additionally includes the political connection variable. Across all specifications, the results remain consistent with the baseline findings. Although the estimated coefficients are smaller in magnitude, they remain statistically significant at least at the 5% level. Moreover, as shown in Table C6, the results are robust when applying this alternative specification to the education heterogeneity analysis presented in Table 1.3.

1.7.3 Sample dependence

FIFA World Cup and regional favoritism

As an additional robustness check, we examine whether our results are affected by grants associated with the 2010 FIFA World Cup hosted by South Africa. In particular, "Sport and Recreation" grants experienced a substantial decline following the shocks. To address this concern, we re-estimate our specifications after excluding these grants from the sample. The results, reported in Table D1 and Table D2 in Appendix D, show that both the baseline estimates and the education-based heterogeneity results remain robust.

[51] Although not distinguishing grants by sector would allow us to analyze grants received on a per-capita basis, we do not pursue this approach, as the fine-grained fixed effects account for population differences as long as municipal populations remain stable over this relatively short time period.

Excluding dismissed cabinet members

Our results could also be affected by the dismissal of several corrupt ministers in 2012. To assess this possibility, we re-estimate our specifications after excluding the municipalities of Johannesburg, Nquza Hills, and Umzumbe, which are the birthplaces of the dismissed ministers.[52] As reported in Table D3 and Table D4, the baseline estimates and the education-related heterogeneity results remain robust.

1.8 Conclusion

This paper shows how corruption salience and voter monitoring capacity can mitigate political favoritism during periods of sovereign inflows. Two near-simultaneous shocks—a sharp rise in corruption salience linked to renewed scrutiny of the South Africa Arms Deal and an exogenous sovereign inflow following South Africa's inclusion in the WGBI—allow us to examine how fiscal space is allocated when corruption becomes more visible to voters. We find that, following the shocks, preferential allocations to the birth municipalities of cabinet members declined, particularly in areas where corruption salience was higher and voters were better able to monitor political favoritism. These results highlight the central role of informational conditions in shaping the distributional consequences of sovereign inflows.

More broadly, our findings indicate that transparency and citizen oversight can attenuate the adverse political effects of funding windfalls—such as increased favoritism—especially in contexts characterized by weak institutional quality (Brollo et al., 2013; Caselli & Michaels, 2013; Tornell & Lane, 1999). The contraction in preferential allocations is strongest where corruption was more visible and voter monitoring capacity was higher, suggesting that information and scrutiny meaningfully discipline political behavior in the allocation of public resources.

Finally, our analysis yields policy-relevant implications. Efforts to enhance transparency and improve public oversight can lead to better allocation of fiscal windfalls, even in settings with limited institutional capacity. The South African experience illustrates the potential role of independent

[52] Johannesburg is also the birthplace of Minister Ayanda Dlodlo, who was blacklisted following the publication of the list of municipalities' "Restricted suppliers."

oversight bodies, mandatory disclosure of public spending, and media freedom in increasing accountability. Complementary tools—such as regular audits and participatory budgeting—may further empower citizens to monitor and sanction political favoritism. Future research could explore which specific transparency and accountability mechanisms are most effective in strengthening citizen monitoring, particularly in environments with persistently weak institutions.

References

Acemoglu, D., & Robinson, J. A. (2010). Why is Africa poor? *Economic History of Developing Regions*, *25*(1), 21–50.

Afrobarometer. (2024). South Africa, rounds 4, 5, 6, and 7, years 2008, 2011, 2015 and 2019 [Available at http://www.afrobarometer.org].

Amodio, F., & Chiovelli, G. (2016). Ethnic favoritism in democracy: The political economy of land and labor in South Africa. *Stanford Institute for Theoretical Economics (SITE) (pp. 1–47)*.

Argentieri Mariani, L., & Marchesi, S. (2025). International lending channel, bank heterogeneity and capital inflows (mis) allocation. *European Economic Review. Forthcoming*.

Armand, A., Coutts, A., Vicente, P. C., & Vilela, I. (2020). Does information break the political resource curse? Experimental evidence from Mozambique. *American Economic Review*, *110*(11), 3431–3453.

Asatryan, Z., Baskaran, T., Birkholz, C., & Hufschmidt, P. (2023). Favoritism by the governing elite. (1029).

Auty, R. (2002). *Sustaining development in mineral economies: The resource curse thesis*. Routledge.

Avis, E., Ferraz, C., & Finan, F. (2018). Do government audits reduce corruption? Estimating the impacts of exposing corrupt politicians. *Journal of Political Economy*, *126*(5), 1912–1964.

Baland, J.-M., & Francois, P. (2000). Rent-seeking and resource booms. *Journal of Development Economics*, *61*(2), 527–542.

Banerjee, A., Enevoldsen, N., Pande, R., & Walton, M. (2024). Public information is an incentive for politicians: Experimental evidence from Delhi elections. *American Economic Journal: Applied Economics*, *16*(3), 323–353.

Baskaran, T., & Lopes da Fonseca, M. (2021). Appointed public officials and local favoritism: Evidence from the German states. *Journal of Urban Economics*, *124*, 103354.

BBC. (2011). Call for new South African Arms Deal investigation [2011-06-17].

BBC. (2012). South Africa police chief Bheki Cele fired by Jacob Zuma [2012-06-12].

Berset, S., & Schelker, M. (2020). Fiscal windfall curse. *European Economic Review*, *130*, 103592.

Bhattacharyya, S., & Hodler, R. (2010). Natural resources, democracy and corruption. *European Economic Review*, *54*(4), 608–621.

Bobonis, G. J., Cámara Fuertes, L. R., & Schwabe, R. (2016). Monitoring corruptible politicians. *American Economic Review*, *106*(8), 2371–2405.

Bommer, C., Dreher, A., & Perez-Alvarez, M. (2022). Home bias in humanitarian aid: The role of regional favoritism in the allocation of international disaster relief. *Journal of Public Economics*, *208*, 104604.

Bomprezzi, P., Dreher, A., Fuchs, A., Hailer, T., Kammerlander, A., Kaplan, L., Marchesi, S., Masi, T., Robert, C., Unfried, K., et al. (2024). Wedded to prosperity? Informal influence in the allocation of foreign aid. *CEPR Discusion Paper N. 18878*.

Borge, L.-E., Parmer, P., & Torvik, R. (2015). Local natural resource curse? *Journal of Public Economics*, *131*, 101–114.

Brollo, F., Nannicini, T., Perotti, R., & Tabellini, G. (2013). The political resource curse. *American Economic Review*, *103*(5), 1759–1796.

Broner, F., Martin, A., Pandolfi, L., & Williams, T. (2021). Winners and losers from sovereign debt inflows. *Journal of International Economics*, *130*.

Brunetti, A., & Weder, B. (2003). A free press is bad news for corruption. *Journal of Public Economics*, *87*(7-8), 1801–1824.

Burgess, R., Jedwab, R., Miguel, E., Morjaria, A., & Padró i Miquel, G. (2015). The value of democracy: Evidence from road building in Kenya. *American Economic Review*, *105*(6), 1817–51.

Carozzi, F., & Repetto, L. (2016). Sending the pork home: Birth town bias in transfers to Italian municipalities. *Journal of Public Economics*, *134*, 42–52.

Caselli, F., & Michaels, G. (2013). Do oil windfalls improve living standards? Evidence from Brazil. *American Economic Journal: Applied Economics*, *5*(1), 208–238.

Chen, T., & Kung, J.-S. (2016). Do land revenue windfalls create a political resource curse? Evidence from China. *Journal of Development Economics*, *123*, 86–106.

Chong, A., De La O, A. L., Karlan, D., & Wantchekon, L. (2015). Does corruption information inspire the fight or quash the hope? A field experiment in Mexico on voter turnout, choice, and party identification. *The Journal of Politics*, *77*(1), 55–71.

Cremers, M., Ferreira, M. A., Matos, P., & Starks, L. (2016). Indexing and active fund management: International evidence. *Journal of Financial Economics*, *120*(3), 539–560.

Cruz, C., Keefer, P., Labonne, J., & Trebbi, F. (2024). Making policies matter: Voter responses to campaign promises. *The Economic Journal*, ueae008.

De Kadt, D., & Lieberman, E. S. (2020). Nuanced accountability: Voter responses to service delivery in southern Africa. *British Journal of Political Science*, (50 (1)), 185–215.

De Kadt, D., & Larreguy, H. A. (2018). Agents of the regime? Traditional leaders and electoral politics in South Africa. *The Journal of Politics*, *80*(2), 382–399.

De Luca, G., Hodler, R., Raschky, P. A., & Valsecchi, M. (2018). Ethnic favoritism: An axiom of politics? *Journal of Development Economics*, *132*, 115–129.

Dickens, A. (2018). Ethnolinguistic favoritism in African politics. *American Economic Journal: Applied Economics*, *10*(3), 370–402.

Do, Q.-A., Nguyen, K.-T., & Tran, A. N. (2017). One Mandarin benefits the whole clan: Hometown favoritism in an authoritarian regime. *American Economic Journal: Applied Economics*, *9*(4), 1–29.

Dreher, A., Fuchs, A., Hodler, R., Parks, B. C., Raschky, P. A., & Tierney, M. J. (2019). African leaders and the geography of China's foreign assistance. *Journal of Development Economics*, *140*, 44–71.

Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. J. (2022). *Banking on Beijing: The aims and impacts of China's overseas development program*. Cambridge University Press.

Fernández, A., Klein, M. W., Rebucci, A., Schindler, M., & Uribe, M. (2016). Capital control measures: A new dataset. *IMF Economic Review*, *64*(3), 548–574.

Ferraz, C., & Finan, F. (2008). Exposing corrupt politicians: The effects of Brazil's publicly released audits on electoral outcomes. *The Quarterly Journal of Economics*, *123*(2), 703–745.

Ferraz, C., & Finan, F. (2011). Electoral accountability and corruption: Evidence from the audits of local governments. *American Economic Review*, *101*(4), 1274–1311.

Fiva, J. H., & Halse, A. H. (2016). Local favoritism in at-large proportional representation systems. *Journal of Public Economics*, *143*, 15–26.

Francois, P., Rainer, I., & Trebbi, F. (2015). How is power shared in Africa? *Econometrica*, *83*(2), 465–503.

Fuchs, A., & Gehring, K. (2017). The home bias in sovereign ratings. *Journal of the European Economic Association*, *15*(6), 1386–1423.

Glaeser, E. L., & Saks, R. E. (2006). Corruption in America. *Journal of Public Economics*, *90*(6-7), 1053–1072.

Hobdari, N., Nguyen, V., Dell'Erba, S., & Ruggiero, E. (2018). Lessons for effective fiscal decentralization in sub-Saharan Africa. *Departmental Paper Series, African Department, International Monetary Fund (IMF)*, (18/10).

Hodler, R. (2006). The curse of natural resources in fractionalized countries. *European Economic Review*, *50*(6), 1367–1386.

Hodler, R., & Raschky, P. A. (2014). Regional Favoritism. *The Quarterly Journal of Economics*, *129*(2), 995–1033.

Imai, K., Kim, I. S., & Wang, E. H. (2023). Matching methods for causal inference with time-series cross-sectional data. *American Journal of Political Science*, *67*(3), 587–605.

Knysna Municipality. (2017). Financial statements for the year ended 30 June 2017.

Kroth, V., Larcinese, V., & Wehner, J. (2016). A better life for all? Democratization and electrification in post-apartheid South Africa. *The Journal of Politics*, *78*(3), 774–791.

Larreguy, H., Marshall, J., & Snyder, J., James M. (2020). Publicising malfeasance: When the local media structure facilitates electoral accountability in Mexico. *The Economic Journal*, *130*(631), 2291–2327.

Levitt, S. D., & Snyder Jr, J. M. (1997). The impact of federal spending on House election outcomes. *Journal of Political Economy*, *105*(1), 30–53.

Mehlum, H., Moene, K., & Torvik, R. (2006). Institutions and the resource curse. *The Economic Journal*, *116*(508), 1–20.

Molemoeng, N. N. (2014). *Capital account liberalisation and its benefits for South Africa*. University of Johannesburg (South Africa).

Municipal Finance Data. (2023). Department of National Treasury of the Republic of South Africa [Accessed: April 2023].

News24. (2012). Dlodlo blacklisted [2012-12-09].

Obikili, N. (2019). The impact of political competition on economic growth: Evidence from municipalities in South Africa. *South African Journal of Economics*, *87*(1), 3–21.

Oosthuizen, M., & Thornhill, C. (2017). The grant system of financing the South African local government sphere: Can sustainable local government be promoted? *Local Economy*, *32*(5), 433–450.

Pandolfi, L., & Williams, T. (2019). Capital flows and sovereign debt markets: Evidence from index rebalancings. *Journal of Financial Economics*, *132*(2), 384–403.

Persson, T., Tabellini, G., & Trebbi, F. (2003). Electoral rules and corruption. *Journal of the European Economic Association*, *1*(4), 958–989.

Ploeg, F. v. d. (2011). Natural resources: Curse or blessing? *Journal of Economic Literature*, *49*(2), 366–420.

Raddatz, C., Schmukler, S. L., & Williams, T. (2017). International asset allocations and capital flows: The benchmark effect. *Journal of International Economics*, *108*, 413–430.

Robinson, J. A., Torvik, R., & Verdier, T. (2006). Political foundations of the resource curse. *Journal of Development Economics*, *79*(2), 447–468.

Sachs, J. D., & Warner, A. M. (1999). The big push, natural resource booms and growth. *Journal of Development Economics*, *59*(1), 43–76.

Sienaert, A. (2012). Foreign investment in local currency bonds–considerations for emerging market public debt managers. *World Bank Policy Research Working Paper*, (6284).

Statistics South Africa. (2008). Community Survey 2007 [dataset] [Version 1.2. Pretoria: Statistics South Africa [producer], 2008. Cape Town: DataFirst [distributor], 2010. DOI: https://doi.org/10.25828/0nqv-ns26].

Statistics South Africa. (2015). Census 2011 [dataset] [Accessed: May 2024].

Statistics South Africa. (2017). Community Survey 2016 [dataset] [Version 1. Pretoria: Statistics South Africa [producer], 2017. Cape Town: DataFirst [distributor], 2017. DOI: 10.25828/12sy-yj26].

The Economist. (2024). Why South Africans are fed up after 30 years of democracy [2024-05-02].

Tornell, A., & Lane, P. R. (1999). The voracity effect. *American Economic Review*, *89*(1), 22–46.

Torvik, R. (2002). Natural resources, rent seeking and welfare. *Journal of Development Economics*, *67*(2), 455–470.

Vicente, P. C. (2010). Does oil corrupt? Evidence from a natural experiment in West Africa. *Journal of Development Economics*, *92*(1), 28–38.

Walters, L., Bittencourt, M., & Chisadza, C. (2023). Public infrastructure provision and ethnic favouritism: Evidence from South Africa. *Economics of Transition and Institutional Change*, *31(1)*, 33–65.

Weitz-Shapiro, R., & Winters, M. S. (2017). Can citizens discern? Information credibility, political sophistication, and the punishment of corruption in Brazil. *The Journal of Politics*, *79*(1), 60–74.

Widmer, P., & Zurlinden, N. (2022). Ministers engage in favoritism too. *Journal of Public Economics*, *213*, 104707.

World Bank. (2023). World Development Indicators.

WSJ. (2011). Ferrostaal internal probe finds "questionable" payments [2011-10-10].

Appendices

Appendix A: Descriptive and additional results

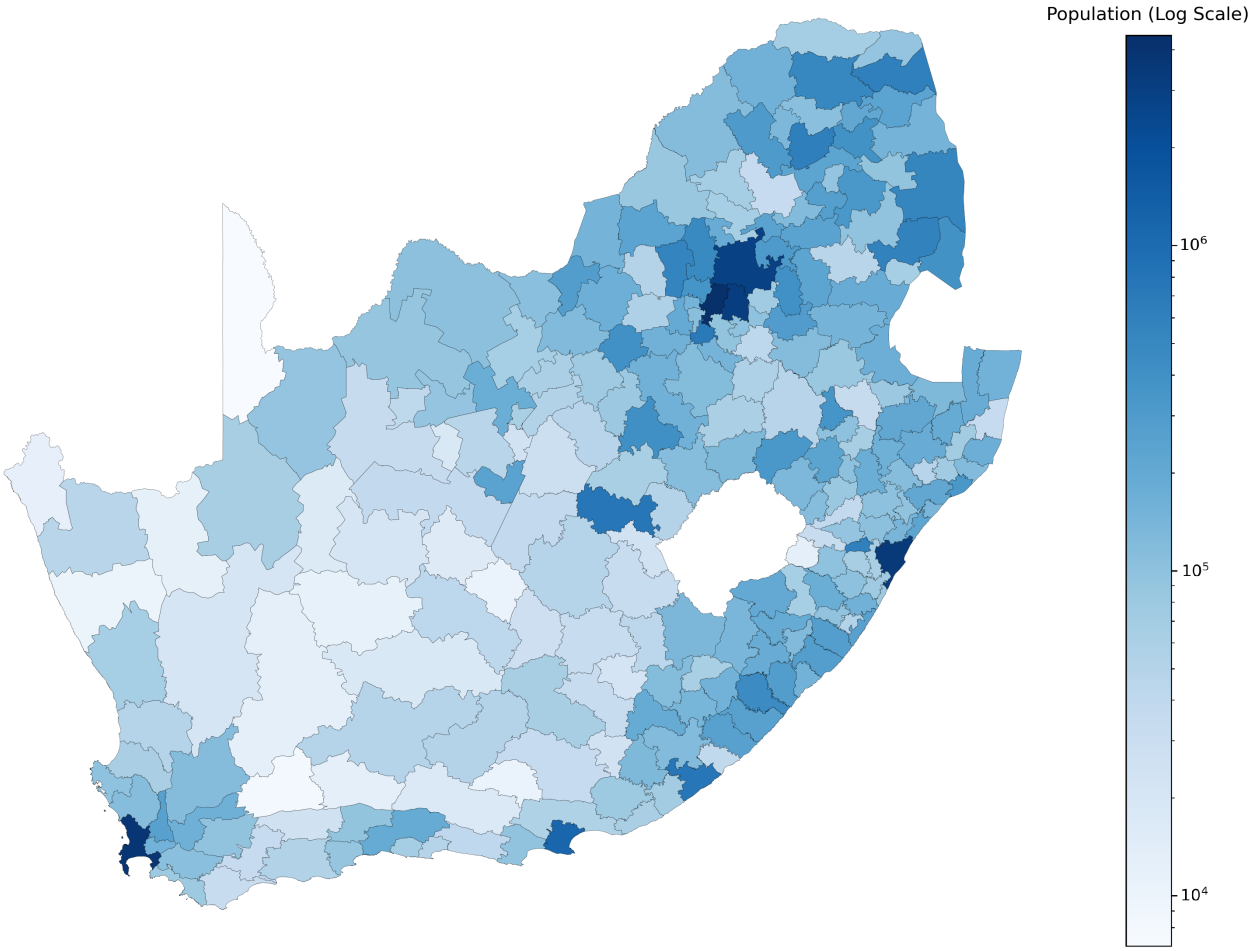
Appendix B: Identification

Appendix C: Alternative specifications

Appendix D: Sample dependence

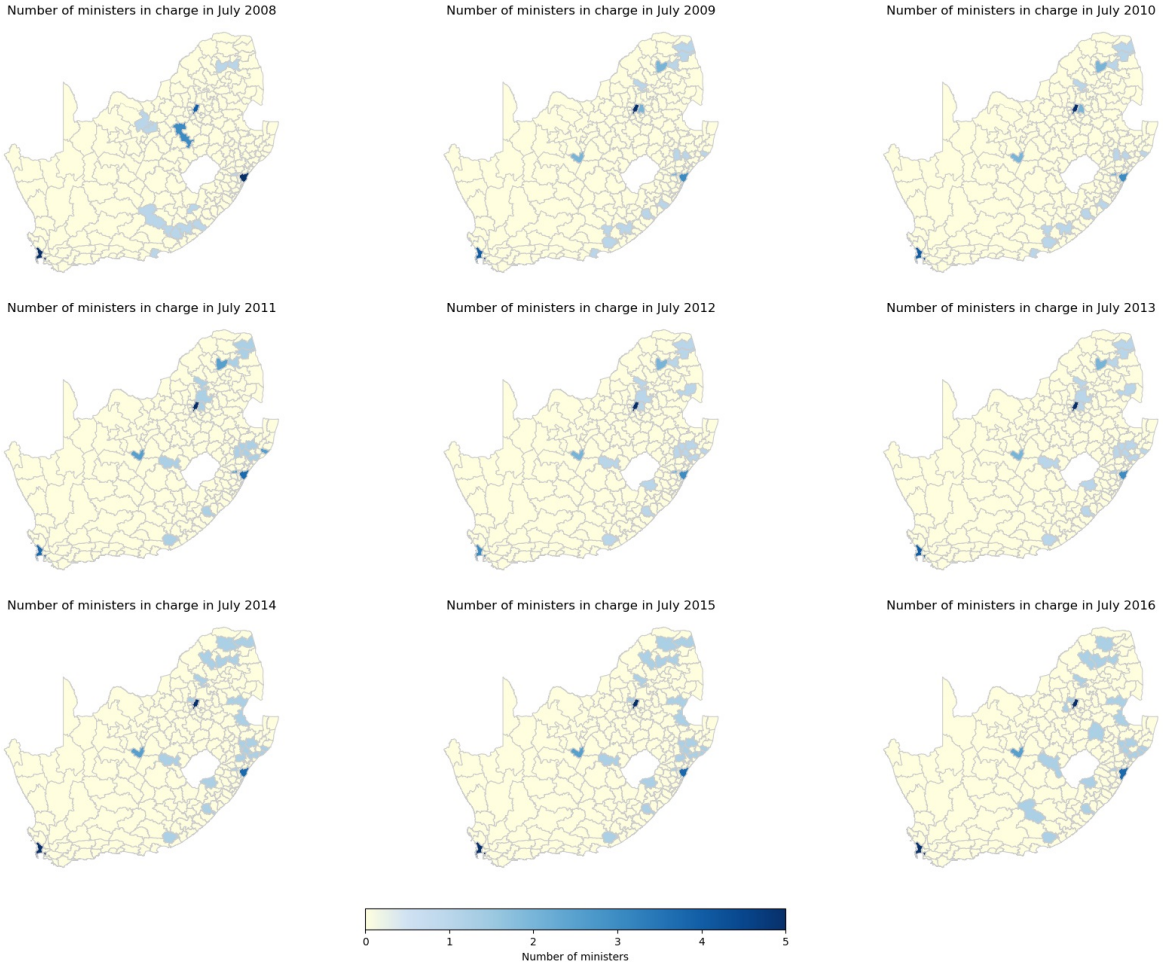
Appendix A: Descriptive and additional results

Figure A1: Population of South African municipalities as of Census 2011



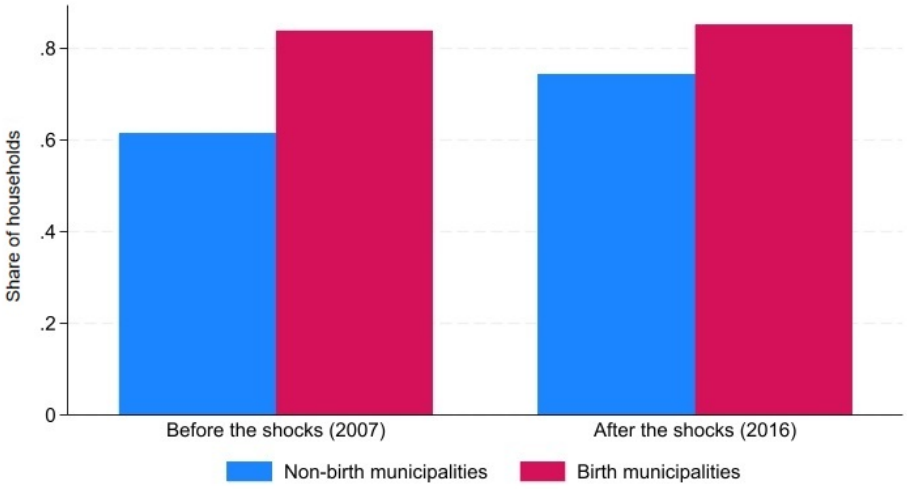
Notes: The map shows the population (logarithmic scale) of South African municipalities based on Census 2011 data. Darker shades of blue indicate municipalities with higher population. The boundaries reflect the demarcation changes implemented in May 2011.

Figure A2: Number of ministers originating from each South African municipality over time



Notes: The map shows the number of cabinet members in power as of July of each year who are natives of South African municipalities. The blue shading represents the number of ministers born in a municipality, ranging from 1 (light blue) to 5 (dark blue). Municipalities in yellow indicate non-birthplaces of cabinet members.

Figure A3: Households access to adequate sanitation before and after the shocks in birth and non-birth municipalities



Notes: The figure reports the share of households with access to adequate sanitation. The blue bar represents the share in non-birth municipalities, while the red bar represents the share in birth municipalities. The graph on the left shows the share of households with access to adequate sanitation before the shocks, while the graph on the right shows it after the shocks.

Table A1: Number of ministers by South African municipality and year

Financial year ends	Ministers						Tot.
	0	1	2	3	4	5	
2009	217	12	0	1	1	2	233
2010	213	13	4	1	1	1	233
2011	213	13	4	1	1	1	233
2012	213	14	4	2	1	0	234
2013	210	17	3	2	0	1	233
2014	210	18	2	1	1	1	233
2015	209	21	1	1	2	0	234
2016	174	21	1	1	2	0	199
2017	187	21	1	1	2	0	212

Notes: Number of municipalities that are the birthplaces of cabinet members at the beginning of each financial year for which financial data are available.

Table A2: Total Ministers and new appointments by year

Financial year ends	Total	New
2009	30	-
2010*	36	25
2011	36	0
2012	36	7
2013	36	3
2014	36	2
2015*	37	11
2016	37	0
2017	38	3

Notes: Total number of cabinet members over the financial years, along with the number of new members compared to the previous financial year. Financial years marked with * denote the first years after national elections.

Table A3: Ministers and birth municipalities characteristics before and after the shocks

Variable	Mean Pre	Obs. Pre	Mean Post	Obs. Post	Mean Diff.	Std. Error
Panel A: Ministers						
Male	0.61	127	0.61	171	0.01	0.06
Age	56.60	122	53.26	155	3.33***	0.84
ANC	0.94	125	0.95	166	-0.01	0.03
Panel B: Birth Mun.						
Households	297,469.62	77	243,149.84	121	54,319.78	59,446.22
Poor households	0.63	77	0.63	121	0	0.01
ANC winner	0.83	77	0.77	121	0.06	0.06
Adequate water	0.87	77	0.86	121	0.01	0.02
Adequate sanitation	0.64	77	0.62	121	0.02	0.03
Adequate waste collection	0.52	77	0.47	121	0.05	0.05
High education	0.10	77	0.10	121	0	0.01
Tribal households	33,923.08	77	38,069.07	121	-4,145.99	5,626.91
Avg. income	84,707.44	77	83,473.63	121	1,233.81	6,209.26
Seats	87.53	77	80.45	121	7.09	10.11
Unemployment	0.36	77	0.34	121	0.01	0.01

Notes: The table reports t-tests on pre- and post-shock mean differences in ministers' characteristics (Panel A) and birth municipalities' characteristics (Panel B). Differences in means may not be precise due to rounding.

Table A4: Definition and sources

Variable	Description	Source	Unit
Dependent variables			
Capital grants by sector	Transfers recognised as capital deflated using the CPI index at the end of the year	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	Rand
ANC Municipal Majority	Dummy=1 if the ANC has the majority of seats after elections	Own elaboration from the Electoral Commission of South Africa	Binary
Irregular expenditures	Irregular expenditures deflated using the CPI index at the end of the year, divided by municipality population	Own elaboration from Municipal Finance Data - "Unauthorised, Irregular, Fruitless and Wasteful Expenditure" dataset (from 2012) and from "Auditors financial statements" of each municipality (for 2010 and 2011)	Rand
Unauthorised expenditures	Unauthorised expenditures deflated using the CPI index at the end of the year, divided by municipality population	Own elaboration from Municipal Finance Data - "Unauthorised, Irregular, Fruitless and Wasteful Expenditure" dataset (from 2012) and from "Auditors financial statements" of each municipality (for 2010 and 2011)	Rand
Fruitless expenditures	Fruitless expenditures deflated using the CPI index at the end of the year, divided by municipality population	Own elaboration from Municipal Finance Data - "Unauthorised, Irregular, Fruitless and Wasteful Expenditure" dataset (from 2012) and from "Auditors financial statements" of each municipality (for 2010 and 2011)	Rand
Piped water	Dummy = 1 if the household has piped water inside their dwelling, in the yard or within 200 meters of their dwelling	Own elaboration from Community Survey 2007 and 2016	Binary
Adequate sanitation	Dummy = 1 if the household has flush toilet, chemical toilet, pit toilet with ventilation or ecological toilet	Own elaboration from Community Survey 2007 and 2016	Binary
Waste collection	Dummy = 1 if the household hass access to refuse removal at least once a week	Own elaboration from Community Survey 2007 and 2016	Binary
President	Dummy = 1 if the individual has answered that at least "Some of them" to the question "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: The President and Officials in his Office?"	Afrobarometer data, rounds 4, 5, and 6, years 2008, 2011 and 2015	Binary
Parliament	Dummy = 1 if the individual has answered that at least "Some of them" to the question "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: Parliament?"	Afrobarometer data, rounds 4, 5, and 6, years 2008, 2011 and 2015	Binary
Local government	Dummy = 1 if the individual has answered that at least "Some of them" to the question "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: Local government?"	Afrobarometer data, rounds 4, 5, and 6, years 2008, 2011 and 2015	Binary

Judges	Dummy = 1 if the individual has answered that at least "Some of them" to the question "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: Judges?"	Afrobarometer data, rounds 4, 5, and 6, years 2008, 2011 and 2015	Binary
Taxes	Property rates plus penalties and collection charges applied on property rates deflated using CPI index	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	Rand
Charges	Service charges deflated using CPI index	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	Rand
Operating grants	Transfers recognised as operating deflated using the CPI index at the end of the year	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	Rand
Other revenues	Total operating revenues minus transfers recognised as capital and transfers recognised as operating deflated using the CPI index at the end of the year	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	Rand
Per capita capital grants	Transfers recognised as capital deflated using the CPI index at the end of the year, divided by municipality population	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	Rand
Independent variables of interest			
Municipality Cabinet Members	Number of ministers born in a municipality in power in a given year	Own elaboration from Asatryan et al. 2023, Widmer and Zurlinden 2022, and hand collected data	Numeric
Post	Dummy=1 if financial year > 2012 and 0 otherwise	Own calculation	Binary
Above median irregular expenditure in 2011	Dummy=1 if a municipality reported a value of irregular expenditures above the median in 2011	Own elaboration from the municipality "Auditors financial statements" of 2011	Binary
Above median high education in 2011	Dummy=1 if a municipality have a share of citizens at least 20 years old with a high education above the median in 2011	Own calculation from Census 2011	Binary
Avg. Municipality Cabinet Members	Average number of ministers born in a municipality in power in a specific period	Own elaboration from Asatryan et al. 2023, Widmer and Zurlinden 2022, and hand collected data	Numeric
Mun. Cabinet Members with Spending Capacity	Number of ministers with spending capacity according to the "Division of Revenue Bill" born in a municipality and in power in a given year	Own elaboration from Asatryan et al. 2023, Widmer and Zurlinden 2022, and hand collected data, and based on the "Division of Revenue Bill" from financial year 2009 to 2017	Numeric
Baseline formula controls			
Quartile of total households in 2011	Quartile of the distribution of households in which the municipality falls in 2011	Own elaboration Census 2011	Numeric
Percentage of poor households in 2011	Percentage of poor households in a municipality in 2011	Own elaboration from Census 2011	%
Voting variables			
ANC 2011 winner	Dummy = 1 if the ANC had the majority of seats in the municipal council in 2011	Own elaboration from the Electoral Commission of South Africa	Binary
Piped water share	Percentage of household with piped water inside their dwelling, in the yard or within 200 meters of their dwelling, in a municipality in 2011	Own elaboration from Census 2011	%
Adequate sanitation share	Percentage of household with flush toilet, chemical toilet, pit toilet with ventilation or ecological toilet in a municipality in 2011	Own elaboration from Census 2011	%
Adequate waste collection share	Percentage of household with access to refuse removal in a municipality in 2011 as established by the "Division of Revenue Bill"	Own elaboration from Census 2011	%

Development formula controls			
Operating formula controls			
Avg. household income	Average household income in a municipality in 2011	Own calculation from Census 2011	Rand
Tribal households	Percentage of households living in traditional or tribal areas in a municipality in 2011	Own elaboration from Census 2011	%
Unemployment	Unemployment rate in a municipality in 2011	Own elaboration from Census 2011	%
Total seats	Total number of seats in a municipality council in 2011	Electoral Commission of South Africa	Numeric
Other controls and variables			
Grants dependence in 2011	Sum of transfer recognised as capital and transfer recognised as operating, divided by total operating revenues	Own elaboration from Municipal Finance Data - "Income and Expenditure" dataset	%
Population	Population in a municipality in 2011	Census 2011	Numeric
CPI	South Africa's consumer price index at the end of the year	World Development Indicators	Numeric
GDP	South Africa's gross domestic product	Own elaboration from Statistics South Africa	Millions of rand

Table A5: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Capital grants by sector (in millions of rand)	31,888	4.91	42.69	0	2,094.34
Municipality cabinet members	31,895	0.15	0.55	0	5
Total households in 2011	31,888	61,783.88	159,028.27	1,784	1,434,856
Percentage of poor households in 2011	31,888	0.64	0.10	0.41	0.81
ANC winner in 2011	31,888	0.77	0.42	0	1

Notes: It reports the summary statistics of the variables included in Table 1.1.

Table A6: Political favoritism, external shocks and corruption perception

	President	Parliament	Local gov.	Judges
	(1)	(2)	(3)	(4)
Municipality Cabinet Members	-0.0671***	-0.0432***	-0.0131	-0.0390*
	(0.0254)	(0.0152)	(0.0134)	(0.0214)
Post ×	0.0290*	0.0222**	0.0290**	0.0304
Municipality Cabinet Members	(0.0149)	(0.0107)	(0.0114)	(0.0208)
Observations	6,140	6,466	6,662	6,407
R-squared	0.245	0.14	0.120	0.136
Municipalities FE	Yes	Yes	Yes	Yes
Baseline formula controls in 2011 x period	Yes	Yes	Yes	Yes
ANC 2011 winner x period	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes

Notes: The dependent variable is a dummy equal to one if the individual perceives a given entity to be corrupt: the President (column 1), Parliament (column 2), local government (column 3), or judges (column 4). The variables of interest are "Municipality Cabinet Members," defined as the number of ministers born in a municipality and in office in a given year, and "Post x Municipality Cabinet Members," which interacts this measure with a post indicator equal to one for years $t > 2012$. All regressions include municipality fixed effects and a non-linear time trend interacted with municipal characteristics, including the municipality's quartile in the total household distribution, the share of poor households in 2011, and a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011. At the individual level, controls include sex, age, education level, a dummy indicating whether the respondent is Black, indicators for whether the respondent speaks Zulu or Xhosa, and a dummy for urban residence. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Appendix B: Identification

Table B1: Placebo—Favoritism and external shocks in South African municipalities on other revenues

	Taxes	Charges	Other	Oper. Grants
	(1)	(2)	(3)	(4)
Municipality Cabinet Members	0.320	-0.051	-0.010	0.134
	(0.231)	(0.051)	(0.026)	(0.171)
Post ×	-0.032	-0.020	0.002	0.081
Municipality Cabinet Members	(0.085)	(0.041)	(0.018)	(0.104)
Observations	1,993	1,993	1,992	1,993
R-squared	0.659	0.930	0.935	0.498
Municipalities FE	Yes	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes	Yes
Baseline formula controls x year	Yes	Yes	Yes	Yes
ANC 2011 winner x year	Yes	Yes	Yes	Yes

Notes: All dependent variables are expressed as the logarithm of the real outcome of interest plus one. In column 1, the dependent variable is property tax revenue; in column 2, service charges; in column 3, other revenues—defined as total revenues net of capital and operating grants; and in column 4, operating grants. The variables of interest are "Municipality Cabinet Members," defined as the number of ministers born in a municipality and in office in a given year, and "Post × Municipality Cabinet Members," which interacts this measure with a post indicator equal to one for years $t > 2012$. All regressions include municipality fixed effects, indicators for municipalities sharing the same five-year treatment history, and non-linear time trends interacted with municipal characteristics. These characteristics include the municipality's quartile in the distribution of total households in 2011, the share of poor households in 2011, and a dummy equal to one if the ANC held a majority of seats in the municipal council following the 2011 local elections. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table B2: Political favoritism and external shocks in South African municipalities, different history

	Capital grants by sector		
	(1)	(2)	(3)
Municipality Cabinet Members	0.226***	0.19**	0.202**
	(0.0775)	(0.091)	(0.0858)
Post ×	-0.182***	-0.18***	-0.168***
Municipality Cabinet Members	(0.0301)	(0.0346)	(0.0234)
Observations	11,897	11,897	11,803
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
Birthplace history FE		Yes	Yes
Baseline formula controls x year	Yes	Yes	Yes
ANC 2011 winner x year	Yes	Yes	Yes
Years of history	0	1	3
$\delta_1 + \delta_2$ p-value	0.565	0.916	0.67

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest and control variables are specified as in column 3 of Table 1.1. Column 1 does not include controls for municipality treatment history, whereas columns 2 and 3 include indicators for one- and three-year municipality treatment histories, respectively. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table B3: Political favoritism, external shocks, accountability and information processing, different history

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members			
× Below Median High Education in 2011	0.381**	0.342*	0.472***
	(0.169)	(0.175)	(0.182)
× Above Median High Education in 2011	0.214***	0.186**	0.197**
	(0.0797)	(0.0919)	(0.0879)
Post × Mun. Cabinet Members			
× Below Median High Education in 2011	0.762***	0.671***	0.680***
	(0.173)	(0.195)	(0.205)
× Above Median High Education in 2011	0.0227	-0.00254	0.0175
	(0.0778)	(0.0865)	(0.0825)
Observations	11,897	11,897	11,803
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
Birthplace history FE		Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year	Yes	Yes	Yes
ANC 2011 winner x year	Yes	Yes	Yes
Years of history	0	1	3

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest and the control variables are specified as in column 3 of Table 1.3. Column 1 does not include controls for municipality treatment history, whereas columns 2 and 3 include indicators for one- and three-year municipality treatment histories, respectively. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Appendix C: Alternative specification

Table C1: Political favoritism and external shocks in South African municipalities by sector, more controls

	Capital grants by sector		
	(1)	(2)	(3)
Municipality Cabinet Members	0.203**	0.173**	0.194***
	(0.082)	(0.068)	(0.069)
Post ×	-0.156***	-0.175***	-0.160***
Municipality Cabinet Members	(0.026)	(0.035)	(0.037)
Observations	11,690	11,690	11,690
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
Baseline formula controls x year	Yes	Yes	Yes
ANC 2011 winner x year	Yes	Yes	Yes
Development formula controls in 2011 x year	Yes		
Grants dependence in 2011 x year		Yes	
Operating formula controls in 2011			Yes
$\delta_1 + \delta_2$ p-value	0.543	0.969	0.580

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest are "Municipality Cabinet Members," defined as the number of ministers born in a municipality and in office in a given year, and "Post × Municipality Cabinet Members," which interacts this measure with a post indicator equal to one for years $t > 2012$. All regressions include municipality fixed effects, indicators for municipalities sharing the same five-year treatment history, and non-linear time trends interacted with municipal characteristics. These characteristics include the municipality's quartile in the distribution of total households in 2011, the share of poor households in 2011, and a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011. Column 1 additionally includes the share of households in 2011 lacking access to piped water, sanitation, and waste collection—as defined in the "Division of Revenue Bill"—interacted with a non-linear time trend. Column 2 adds the share of municipal revenues derived from government grants in 2011, interacted with a non-linear time trend. Column 3 further includes the municipal unemployment rate, the share of households living in traditional areas, average household income, and the total number of seats in the municipal council, all measured in 2011 and interacted with a non-linear time trend. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table C2: Political favoritism, external shocks, accountability and information processing, more controls

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members			
× Below Median High Education in 2011	0.430**	0.394*	0.454**
	(0.192)	(0.205)	(0.212)
× Above Median High Education in 2011	0.204**	0.167**	0.177***
	(0.083)	(0.067)	(0.065)
Post × Mun. Cabinet Members			
× Below Median High Education in 2011	0.753***	0.694***	0.733***
	(0.193)	(0.207)	(0.207)
× Above Median High Education in 2011	0.027	-0.022	0.010
	(0.076)	(0.058)	(0.059)
Observations	11,690	11,690	11,690
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year	Yes	Yes	Yes
ANC 2011 winner x year	Yes	Yes	Yes
Development formula controls in 2011 x year	Yes		
Grants dependence in 2011 x year		Yes	
Operating formula controls in 2011			Yes

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest and control variables are specified as in column 3 of Table 1.3. Column 1 additionally includes the share of households in 2011 lacking access to piped water, adequate sanitation, and waste collection—as defined in the "Division of Revenue Bill"—interacted with a non-linear time trend. Column 2 adds the share of municipal revenue derived from government grants in 2011, interacted with a non-linear time trend. Column 3 further includes the municipal unemployment rate, the share of households living in traditional areas, average household income, and the total number of seats in the municipal council, all measured in 2011 and interacted with a non-linear time trend. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table C3: Political favoritism and external shocks in South African municipalities by sector, ministers with spending capacity

	Capital grants by sector		
	(1)	(2)	(3)
Mun. Cabinet Members with Spending Capacity	0.248***	0.231***	0.253***
	(0.038)	(0.043)	(0.030)
Post ×	-0.246***	-0.224***	-0.254***
Mun. Cabinet Members with Spending Capacity	(0.027)	(0.041)	(0.042)
	(0.040)	(0.037)	(0.038)
Observations	11,690	11,690	11,690
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes
$\delta_1 + \delta_2$ p-value	0.962	0.853	0.977

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest are "Mun. Cabinet Members with Spending Capacity," defined as the number of cabinet members with spending capacity born in a municipality and in office in a given year, and "Post × Mun. Cabinet Members with Spending Capacity," which interacts this measure with a post indicator equal to one for years $t > 2012$. All regressions include municipality-grant-sector fixed effects, grant-sector-specific non-linear time trends, and indicators for municipalities sharing the same five-year treatment history. Column 2 adds controls for municipal characteristics, including the municipality's quartile in the distribution of total households and the share of poor households in 2011, both interacted with non-linear time trends. Column 3 further introduces a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011, interacted with a non-linear time trend. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table C4: Political favoritism, external shocks, accountability and information processing, ministers with spending capacity

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members with Spending Capacity			
× Below Median High Education in 2011	0.218***	0.227**	0.153*
	(0.084)	(0.102)	(0.085)
× Above Median High Education in 2011	0.228***	0.235***	0.255***
	(0.035)	(0.041)	(0.030)
Post × Mun. Cabinet Members with Spending Capacity			
× Below Median High Education in 2011	0.485***	0.449**	0.583***
	(0.184)	(0.176)	(0.174)
× Above Median High Education in 2011	0.003	0.005	-0.013
	(0.039)	(0.036)	(0.038)
Observations	11,690	11,690	11,690
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest are triple interactions capturing birth-region favoritism by cabinet members with spending capacity, differentiated by education levels and timing relative to the shocks. Specifically, "Pre × Mun. Cabinet Members with Spending Capacity × Below Median High Education in 2011" captures favoritism before the shocks in municipalities that are birthplaces of at least one cabinet member with spending capacity and where the share of highly educated residents is below the median in 2011. "Pre × Mun. Cabinet Members with Spending Capacity × Above Median High Education in 2011" captures the corresponding effect in municipalities above the median in 2011. The post-shock counterparts—"Post × Mun. Cabinet Members with Spending Capacity × Below Median High Education in 2011" and "Post × Mun. Cabinet Members with Spending Capacity × Above Median High Education in 2011"—capture favoritism after the shocks in municipalities below and above the median education threshold in 2011, respectively. All regressions include municipality-grant-sector fixed effects, grant-sector-specific non-linear time trends, indicators for municipalities sharing the same five-year treatment history, and a non-linear time trend interacted with a dummy indicating whether the municipality's share of highly educated residents is above the median. Column 2 additionally includes non-linear time trends interacted with municipal characteristics, namely the municipality's quartile in the distribution of total households in 2011 and the share of poor households in 2011. Column 3 further adds a non-linear time trend interacted with a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table C5: Favoritism and external shocks in South African municipalities, without sector disaggregation

	Capital grants by sector		
	(1)	(2)	(3)
Municipality Cabinet Members	0.127***	0.130**	0.141**
	(0.044)	(0.051)	(0.062)
Post ×	-0.169***	-0.178***	-0.165***
Municipality Cabinet Members	(0.024)	(0.033)	(0.030)
Observations	1,993	1,993	1,993
Municipalities FE	Yes	Yes	Yes
5-years Birthplace History FE	Yes	Yes	Yes
Year FE	Yes		
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes
$\delta_1 + \delta_2$ p-value	0.434	0.341	0.657

Notes: The dependent variable is the total real amount of capital grants received by a municipality in a given year. The variables of interest are "Municipality Cabinet Members," defined as the number of ministers born in a municipality and in office in a given year, and "Post × Municipality Cabinet Members," which interacts this measure with a post indicator equal to one for years $t > 2012$. All regressions include municipality fixed effects and indicators for municipalities sharing the same five-year treatment history. Column 1 includes year fixed effects. Column 2 adds controls for municipal characteristics—namely, the municipality's quartile in the distribution of total households and the share of poor households in 2011—both interacted with non-linear time trends. Column 3 further includes a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011, interacted with a non-linear time trend. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Table C6: Political favoritism, external shocks, accountability and information processing, without sector disaggregation

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members			
× Below Median High Education in 2011	0.350*	0.392**	0.374**
	(0.179)	(0.180)	(0.179)
× Above Median High Education in 2011	0.107**	0.130***	0.137**
	(0.049)	(0.050)	(0.063)
Post × Mun. Cabinet Members			
× Below Median High Education in 2011	0.510***	0.557***	0.575***
	(0.152)	(0.148)	(0.161)
× Above Median High Education in 2011	-0.061	-0.060	-0.040
	(0.057)	(0.052)	(0.057)
Observations	1,993	1,993	1,993
Municipalities FE	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes

Notes: The dependent variable is the total real amount of capital grants received by a municipality in a given year. The variables of interest are triple interaction terms capturing birth-region favoritism by cabinet members, differentiated by education levels and timing relative to the shocks. Specifically, "Pre × Mun. Cabinet Members × Below Median High Education in 2011" captures favoritism before the shocks in municipalities where the share of highly educated residents is below the median in 2011, while "Pre × Mun. Cabinet Members × Above Median High Education in 2011" captures the corresponding effect in municipalities above the median in 2011. The post-shock counterparts—"Post × Mun. Cabinet Members × Below Median High Education in 2011" and "Post × Mun. Cabinet Members × Above Median High Education in 2011"—capture favoritism after the shocks in municipalities below and above the median education threshold in 2011, respectively. All regressions include municipality fixed effects, indicators for municipalities sharing the same five-year treatment history, and a non-linear time trend interacted with a dummy indicating whether the municipality's share of highly educated residents is above the median. Column 2 additionally includes non-linear time trends interacted with municipal characteristics, namely the municipality's quartile in the distribution of total households and the share of poor households in 2011. Column 3 further adds a non-linear time trend interacted with a dummy equal to one if the ANC held a majority of seats in the municipal council in 2011. Standard errors (in parenthesis) are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Appendix D: Sample dependence

Table D1: Political favoritism and external shocks in South African municipalities, without "Sports and recreation" grants

	Capital grants by sector		
	(1)	(2)	(3)
Municipality Cabinet Members	0.140	0.141	0.199**
	(0.110)	(0.101)	(0.090)
Post ×	-0.182***	-0.179***	-0.171***
Municipality Cabinet Members	(0.021)	(0.036)	(0.035)
Observations	11,022	11,022	11,022
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes
$\delta_1 + \delta_2$ p-value	0.697	0.687	0.723

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest, control variables, fixed effects and standard errors (in parenthesis) follow the same specification as in Table 1.1. *** p<0.01, ** p<0.05, * p<0.1

Table D2: Political favoritism, external shocks, accountability and information processing, without "Sports and recreation" grants

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members			
× Below Median High Education in 2011	0.438**	0.489**	0.432**
	(0.200)	(0.203)	(0.203)
× Above Median High Education in 2011	0.110	0.138	0.195**
	(0.110)	(0.098)	(0.092)
Post × Mun. Cabinet Members			
× Below Median High Education in 2011	0.700***	0.754***	0.767***
	(0.187)	(0.185)	(0.195)
× Above Median High Education in 2011	-0.063	-0.057	0.009
	(0.109)	(0.094)	(0.081)
Observations	11,022	11,022	11,022
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest, control variables, fixed effects and standard errors (in parenthesis) follow the same specification as in Table 1.3. *** p<0.01, ** p<0.05, * p<0.1

Table D3: Political favoritism and external shocks in South African municipalities by sector, without dismissed ministers

	Capital grants by sector		
	(1)	(2)	(3)
Municipality Cabinet Members	0.120*	0.118*	0.153**
	(0.073)	(0.064)	(0.068)
Post ×	-0.209***	-0.199***	-0.183***
Municipality Cabinet Members	(0.024)	(0.040)	(0.039)
Observations	11,520	11,520	11,520
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes
$\delta_1 + \delta_2$ p-value	0.2	0.155	0.627

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest, control variables, fixed effects and standard errors (in parenthesis) follow the same specification as in Table 1.1. *** p<0.01, ** p<0.05, * p<0.1

Table D4: Political favoritism, external shocks, accountability and information processing, without dismissed ministers

	Capital grants by sector		
	(1)	(2)	(3)
Pre × Mun. Cabinet Members			
× Below Median High Education in 2011	0.401**	0.418**	0.392*
	(0.192)	(0.199)	(0.202)
× Above Median High Education in 2011	0.090	0.114*	0.146**
	(0.069)	(0.060)	(0.069)
Post × Mun. Cabinet Members			
× Below Median High Education in 2011	0.624***	0.668***	0.672***
	(0.171)	(0.172)	(0.180)
× Above Median High Education in 2011	-0.113*	-0.103*	-0.048
	(0.068)	(0.059)	(0.063)
Observations	11,520	11,520	11,520
Municipalities x grants sector FE	Yes	Yes	Yes
Grants sector x year	Yes	Yes	Yes
5-years birthplace history FE	Yes	Yes	Yes
High education x year	Yes	Yes	Yes
Baseline formula controls x year		Yes	Yes
ANC 2011 winner x year			Yes

Notes: The dependent variable is the total real amount of capital grants by sector received by a municipality in a given year. The variables of interest, control variables, fixed effects and standard errors (in parenthesis) follow the same specification as in Table 1.3. *** p<0.01, ** p<0.05, * p<0.1

Chapter 2

Follow the Firm: Commercial Ties and the Geography of Aid

Pietro Bomprezzi*, Mattia Longhi†, Silvia Marchesi‡, Rima Turk-Ariss§

2.1 Introduction

On the surface, global development aid is in retreat. In 2024, official development assistance (ODA) volumes fell for the first time in six years as major donors reversed course (OECD, 2025). The United Kingdom changed its ODA target from a 0.5% to a 0.3% of GNI, while Sweden and Germany announced new budget caps (BMZ, 2024; FCDO, 2024; Gov. of Sweden, 2024). Moreover, no donor has undergone as drastic transformation of its foreign aid agenda as the U.S., which as of July 2025 de-facto shut down its main agency (U.S. Department of State, 2025). This retreat marks a turning point in an era of fiscal pressure and nationalist politics, where the legitimacy of foreign aid increasingly depends on whether it delivers tangible returns to donors.

In recent years, donor countries have become more transparent in acknowledging the strategic motivations behind foreign aid. While aid was once framed primarily in development terms, there is now an open debate about its function as an instrument of soft power. Officials increasingly state

*Leibniz University Hannover.

†University of Milan-Bicocca.

‡University of Milan-Bicocca and CefES.

§International Monetary Fund. The views expressed in are those of the authors and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

that aid serves also national interests, both geopolitical and economic (Financial Times, 2024; The Economist, 2025a, 2025b).[1]

One area with which foreign aid has long advanced together is that of countries commercial interests. For example, the overlaps between France's foreign assistance and the overseas activities of national firms such as Bolloré and TotalEnergies have been documented on several occasions (France 24, 2018; Le Monde, 2024). Similar alignments appear elsewhere: Italian aid has supported agribusiness development in Ethiopia while Italian companies expanded food processing and wheat sourcing in the same regions (Eni, 2022). Even under the Trump administration, U.S. aid is being used to reinforce commercial and geopolitical objectives (The Economist, 2025c). These cases illustrate a consistent pattern in which ODA coincides with the foreign expansion of domestic firms.

Previous literature has shown the role that donor-specific characteristics have in bilateral aid allocation patterns (Alesina & Dollar, 2000; Bomprezzi et al., 2024; Dreher et al., 2019), without focusing on the role of economic determinants. Thus, we study the subnational economic determinants of Western aid, focusing on Africa given the importance of the continent as an aid recipient. Specifically, we analyze the role of business ties as a driver of aid flows, testing whether aid flows from 18 European donors and the U.S. to ADM2 regions in Africa are determined by firm ownership linkages between the donor country and the aid recipient region.

Our data comes from two main sources. Geocoded data on project aid is taken from GODAD, the database of subnational official development assistance based on the OECD Creditor Reporting System (CRS) project data, which is compiled by Bomprezzi et al. (2024). To construct our measures of subnational economic ties, we rely on firm ownership data from Orbis to capture both the number and intensity of ownership linkages between firms in donor countries and those located in African aid-recipient ADM2 regions. This paper introduces the first systematic measure of economic linkages at the subnational level, relying on direct business interests as captured through firm ownership ties, to examine how economic determinants shape the allocation of aid flows. To the best of our knowledge, this is the first study to systematically investigate the role of economic ties in subnational aid allocation, thereby shedding light on a previously underexplored dimension of

[1] These include maintaining influence in strategic regions, countering rival powers such as China or Russia, securing trade partnerships, and managing migration flows.

donor self-interest in development finance. Importantly, the subnational perspective allows us to capture these linkages with far greater precision and granularity than country-level analyses, which obscures critical heterogeneity in how economic interests shape aid flows.[2]

We identify the within donor-recipient country pair effect of changes in economic ties on aid flows. Our identification strategy relies on donor-recipient region fixed effects to account for unobserved heterogeneity, as well as donor-year and region-year fixed effects to control for time-specific factors at both ends. In addition, we include a comprehensive set of control variables to control for other important aid determinants. The remaining sources of endogeneity that may bias our results include time-varying, pair-level, omitted variables, and reverse causality. To address this, we use a Bartik-style instrumental variable (IV), following the methodology outlined by Sonno (2025). We instrument the number of Western-owned firms in African regions by a measure of the financial health of the donor country-based parent companies. The logic behind this strategy is that the presence of foreign-owned affiliates in a region is determined not only by local conditions, but also by the financial health of the owner. The presence of a credit crunch (or boom) can differentially affect parent companies based on their financial stability, leading to the closing (or opening) of foreign affiliates.

Our main results indicate that ownership links in an ADM2 region are positively associated with aid. We find that, on average, one additional ownership link in an ADM2 region is associated with a 2.7% higher amount of aid. We find similar results when focusing on ADM1 regions, although the coefficients are in absolute terms smaller. Our results are primarily driven by aid allocated to the social infrastructure sector, which receives the largest share of funding. Our results are also robust to a series of alternative specifications, including differing measures of aid and the use of a similar IV strategy proposed by Sonno (2025).

To explore why aid follows commercial presence, we use additional data on the ownership structure and political activity of donor-country firms. We differentiate between state-owned and privately held firms but we do not find evidence that aid flows disproportionally more to region connected, via local subsidiaries, to state-owned enterprises. However, our results vary significantly by owner size

[2] In this study, we focus on Official Development Assistance, which is provided by Western governments to developing countries' governments with the aim to promote development objectives. We focus on country-to-country flows; thus, aid is not directly provided to firms.

and sector. Specifically, we find that only links related to owners with a large number of employees matter, consistent with the idea that politically visible and economically significant multinationals are the ones shaping donor-country aid decisions. Moreover, these effects are observed only for owners operating in the combined communication and construction sector, as well as in manufacturing, and they are stronger when these firms also have a large number of employees. The concentration of these effects in the combined communication and construction sector is noteworthy, given the strategic relevance of infrastructure-intensive activities in donor-recipient relations.

We also find that our results vary significantly by donor country. We tease out this important donor heterogeneity by providing evidence on the behavior of the largest individual donors: Belgium, France, Germany, Italy, the group of Nordic countries (Denmark, Finland, Norway, and Sweden), Spain, the United Kingdom, and the United States. Our analysis shows that France, the United Kingdom and the U.S. allocate higher aid commitments to African regions where owners of their nationality are present. Thus, besides political motivations, we find evidence that bilateral Western aid is also vulnerable to "economic capture."

This paper relates to three main streams of the literature. First and foremost, it contributes to the vast literature on aid allocation. A number of studies document that geopolitical proximity to DAC donors is associated with various forms of preferential treatment (Alesina & Dollar, 2000; Faye & Niehaus, 2012; Kilby, 2009; Kuziemko & Werker, 2006).[3] While this line of research has primarily emphasized the political dimensions of aid allocation, a smaller set of early studies highlights economic determinants. These papers show a positive association between aid and trade at the national level (Silva & Nelson, 2012; Wagner, 2003), suggesting that stronger trade ties lead to larger aid flows (Bayramoglu et al., 2023; Hoeffler & Sterck, 2022). A key mechanism behind this link is tied aid, which refers to goods and services that the donor supplies directly.[4] Because tied aid explicitly advances business interests in donor countries, its allocation may reflect the incentives of donor-country firms rather than the needs of recipient countries (Ganga, 2024; Jepma, 1991; Knack & Smets, 2013; Morrissey, 1993). More closely related to our work are studies on the link between

[3] When aid allocation is driven by political influence, aid tends to be less effective (Dreher et al., 2013, 2018; Kilby, 2015). Moreover, donors have been criticized for limiting recipient-country "ownership" in development projects, thereby underutilizing local knowledge (Dreher et al., 2017).

[4] A classic example of tied aid is when the implementation of a development project is conditional on contracting firms from the donor country to provide the necessary goods (e.g., medical devices) or services (e.g., consultancy).

aid and commercial interests. Much of this literature focuses on "Aid for Trade" (AfT) schemes, which explicitly promote bilateral commercial interests (Dreher et al., 2024).[5] These studies, however, typically rely on country-level data and use exports as the sole measure of commercial linkages. We advance this literature by introducing firm ownership links as a direct measure of business connections between a donor country and a recipient-country ADM2 region, allowing us to capture both development and commercial incentives behind aid allocation. We show that these economic ties shape subnational aid allocation.[6]

Second, our paper relates to an emerging strand of literature on subnational aid. A number of studies examine subnational aid effectiveness (Bluhm et al., 2025; Cruzatti C. et al., 2023; Dreher & Lohmann, 2015; Dreher et al., 2021; Gehring et al., 2022; Isaksson & Kotsadam, 2018; Marchesi et al., 2025), while others focus on the determinants of subnational aid allocation (Anaxagorou et al., 2020; Bomprezzi et al., 2024; Briggs, 2018a, 2018b, 2021; Dreher et al., 2019).[7] Previous research documents that aid often disproportionately targets wealthier regions within recipient countries (Briggs, 2017, 2018a, 2018b), which tend to coincide with areas of greater economic activity. Some studies have further linked this pattern to the presence of foreign investment; for example, World Bank aid has been shown to flow more heavily to districts with more FDI projects (Nunnenkamp et al., 2017). However, these studies cover only a limited set of donors or contexts, leaving broader patterns largely unexplored. To the best of our knowledge, we are the first to show that donor-specific commercial interests drive subnational aid allocation. We do so by introducing new, granular data on economic linkages between major Western ODA donors—namely, 18 European countries and the United States—and African administrative regions. This allows us to test whether ownership ties between donor-country firms and local economies shape the subnational distribution of aid, pointing to a mechanism of economic favoritism in development assistance.

Finally, our paper contributes to the broader literature on colonial legacies and African economic development (Michalopoulos & Papaioannou, 2020). While canonical work—such as Acemoglu et al. (2001)—emphasizes the role of colonial institutions, more recent research (Chiovelli et al.,

[5] Prior research on AfT suggests that the presence of aid determines economic outcomes, rather than the other way around (Martínez-Zarzoso et al., 2017).

[6] Chauvet and Wagner (2018) provide complementary evidence that bilateral aid can generate substantial returns for donor-country affiliates, raising concerns about the informal tying of aid through public procurement.

[7] While most of this work examines the determinants of Chinese aid in Africa, Bomprezzi et al. (2024) take a broader perspective by considering all donors for which geocoded aid projects are available.

2025) shows that firm-level linkages have long shaped spheres of influence and the spatial distribution of political and economic power. We add to this emerging perspective by demonstrating that similar mechanisms operate today through much finer-grained ownership ties. Our findings also relate to the literature on state–firm relations and global networks (Farrell & Newman, 2019; Maurer, 2013), which argues that firms embedded in national economic infrastructures can amplify state power and condition geopolitical outcomes. We show that cross-border ownership structures can affect foreign policy instruments even in domains conventionally viewed as humanitarian or developmental. Western donor governments appear to respond—directly or indirectly—to the geography of their firms' business interests, implying that corporate networks help shape international economic priorities. In doing so, we connect theories of infrastructural power and network interdependence to micro-level evidence on aid allocation, contributing to a growing strand of work that treats economic linkages as central determinants of international influence.

The rest of the paper is organized as follows. Section 2.2 describes the data. Section 2.3 outlines the baseline empirical model. Section 2.4 shows our main results and Section 2.5 discusses the driving mechanisms. Section 2.6 assesses the robustness of the findings under alternative specifications and the use of an IV strategy. Finally, Section 2.7 concludes the paper.

2.2 Data

We combine data on firm ownership provided by Orbis with data on European and U.S. ODA projects from the *Geocoded Official Development Assistance Dataset* (GODAD) (Bomprezzi et al., 2024) covering the years 2007-2019.[8] Our focus is on African firms controlled by foreign firms based in any of 18 European donor countries and the United States.[9] To achieve this, we measure firm ownership ties between firms based in Western donor countries and their African affiliates. In the following section, we first describe our measure of economic links between donor countries and recipient regions, as well as the Orbis firm ownership data underlying this measure. Then, we provide a brief overview of donor aid data from GODAD, which serves as our primary outcome variable, followed by a description of the subnational controls used in our analysis.

[8] Although GODAD data are available over a longer time span, firm ownership data are available only from 2007.

[9] The European donor countries are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

2.2.1 Firm Ownership

To proxy for subnational economic links between the donor country and the recipient region, we construct a time-varying, donor-recipient region network of ownership ties. We rely on ownership data from Orbis Historical (Bureau van Dijk, 2024) to identify the African firms which are owned by donor-country-based multinationals. Because of its rich ownership data, Orbis has become increasingly popular to measure such firm networks. For example, Altomonte and Rungi (2013) use global Orbis ownership links to characterize business groups, showing how vertical integration and organizational complexity relate to productivity and institutional quality. Del Prete and Rungi (2017) instead test a property-rights models of global value chain organization. Cravino and Levchenko (2017) document how shocks to headquarters transmit to foreign affiliates and thereby across countries. Turk-Ariss et al. (2022) also use changes in foreign ownership of firms within IMF-program countries as a proxy for firms' sensitivity to the policy environment. To capture how financial shocks propagate through firms, Kalemli-Özcan et al. (2022) use information on banking relationships to quantify the role of financial leverage in the performance of European firms.

A key advantage of Orbis lies in its global coverage and the availability of standardized, comparable firm-level balance sheet data across a large sample of countries. Additionally, Orbis includes non-financial firm information, including industry codes, legal identifiers, and detailed ownership structures. With regard to firm ownership information, Bureau van Dijk defines a company's *Global Ultimate Owner* (GUO) as the shareholder that can control, either directly or indirectly through other subsidiaries, more than 50% of the company's voting rights—a definition of control that aligns with international standards for identifying multinational corporations (OECD, 2005). We use these reported firm attributes to geocode the network of African firms owned by donor-country based GUOs from 2007 to 2019. The global coverage in ownership data makes Orbis the best data source for analyzing cross-border ownership connections (Rosati et al., 2020).

For a given African firm, we identify its shareholders and the ownership share they hold in a given year, the shareholder's country of origin, and whether the shareholder is the GUO of the company. We additionally collect other balance sheet information available for each firm and shareholder. Using the country of origin of the firm's GUO, we define the geographical link between the donor-

country based GUO and the firms in an (African) aid recipient region.[10] Our data closely aligns with the affiliate-owner definition used in Sonno (2025).[11] Our final data represents a measure of economic ties between donors and recipient regions, which considers ownership links as a suitable proxy for subnational economic connections.

We extract firm-level data as follows. First, we query Orbis Historical on a year-by-year basis to select all active companies. From this full set, we filter for firms operating in Africa, resulting in over 22 million firms. Next, we retain only African firms whose GUO is from one of the donor countries. Thus, the extracted sample contains the ownership history of African firms with Western shareholders that meet our query criteria.

Orbis provides the location of the legal address of firms, including details such as the country, city, street, and, in some cases, postal code. We use this information to identify the geographical coordinates of each firm's location, which we then aggregate to the ADM2 region level. By combining these geographic details into a single variable for each firm, we account for differences in reporting standards across countries.[12] We use a Google Maps geocoding API to obtain coordinates for each firm based on the address data. After geocoding this information, we aggregate ownership links at the ADM2 level. Aggregating observations at the ADM2 level helps mitigate bias from imprecise geocoding and makes it more likely that the coordinates correspond to the firm's production site rather than solely its headquarters.[13] In total, we are able to geocode 32,895 firms (71% of the total sample) in 45 countries.[14]

Finally, we count the year number of African firms owned by companies from each donor in our sample, located in each African ADM2 region. Figure 2.1 shows the total number of ownership links from Western countries to African firms, summed annually across the entire study period.

[10] We abstract from other alternative measures of control such as control through significant minority ownership, common ownership from shared institutional investors, control based on voting rights, or other indirect control structures.

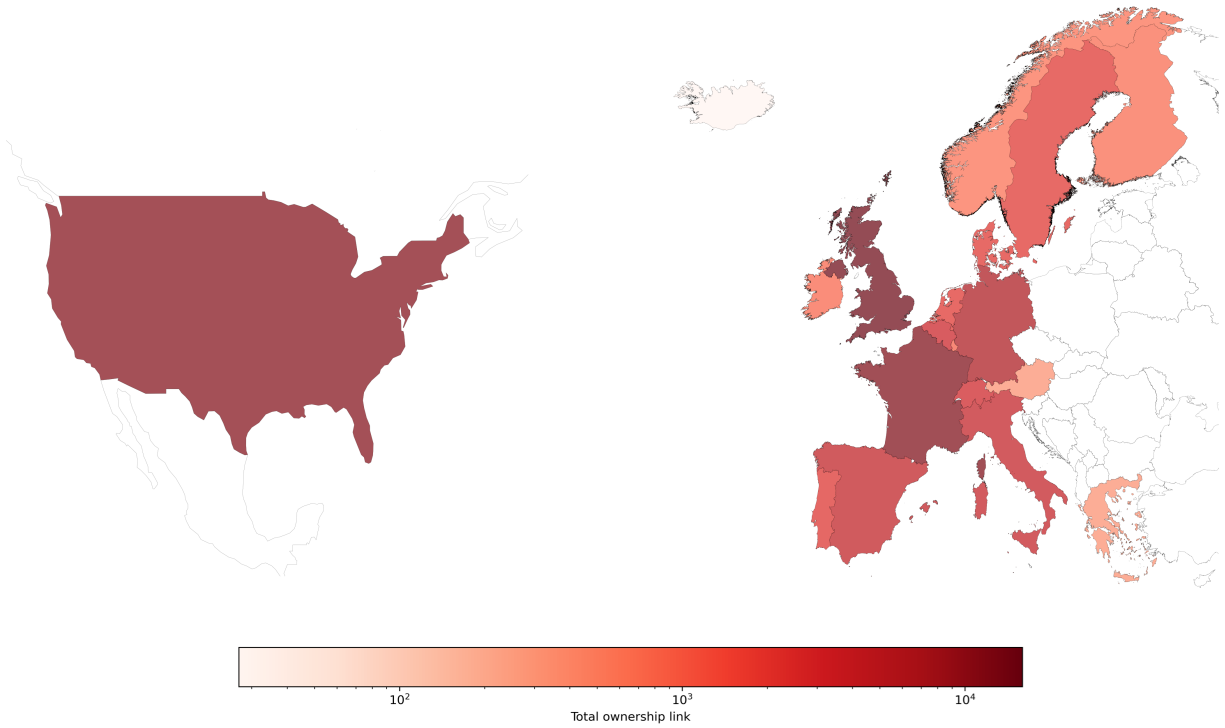
[11] However, while Sonno (2025) limits his analysis to specific types of GUO, we consider all types of GUO available in Orbis.

[12] For example, in Egypt the city field often refers to the ADM1 level, so we combine it with street or postal code data to obtain precise coordinates. In South Africa, the city field already provides detailed location information.

[13] However, it is worth noting that Sonno (2025), who similarly geocoded African firms in Orbis, reports that for 91% of the geocoded firms there is a unique address match on Google Maps. This leads the author to conclude that the recorded address is likely to capture both the legal headquarters and the production site.

[14] We rely on GADM 3.6 polygons for merging the geocoded data with GODAD. As a result, firms located in Cabo Verde, Comoros, Libya, Mauritius, Seychelles, and the Republic of Congo are excluded due to the absence of relevant shapefiles. Moreover, we do not have ownership data for Sierra Leone, Somalia, and Sudan.

Figure 2.1: Total Number of GUO links from donor country



Notes: The map shows the number of African firms owned by donor-country based GUOs over the period 2007-2019. Colored areas represent the donor countries included in our sample, while white areas denote countries that are not part of the sample.

The red shading in the figure indicates the total number of links from 2007 to 2019, whereas the white areas represent countries excluded from our sample. The three main European countries with the highest ownership links in Africa are the United Kingdom, France, and the U.S., with 15,958, 12,721, and 11,727 ownership links, respectively.[15]

We also explore firm-level heterogeneity to examine how the effects may vary, using the primary NACE sectors reported by Orbis.[16] Panel A of Figure A1 in Appendix A presents the total number of links between donor-country–based firms and firms located in recipient regions, segmented by GUO sector. The highest number of links is observed in the manufacturing sector, which is one of

[15]The total ownership links for the other donor countries in our sample are as follows: Austria (348), Belgium (3,456), Denmark (2,104), Finland (734), Germany (6,706), Greece (347), Iceland (27), Ireland (814), Italy (4,066), Luxembourg (918), the Netherlands (2,078), Norway (672), Portugal (2,230), Spain (4,320), Sweden (2,083), and Switzerland (3,213).

[16]Firms' sectors are categorized as follows: agriculture, communication, construction, energy, manufacturing, mining, retail, transport, water, and other. Sectors are defined according to NACE sections, apart for the retail sector that includes both "Wholesale and retail trade; repair of motor vehicles and motorcycles" and "Accommodation and food service activities." The "other sector" includes all remaining NACE sections not mentioned above.

the largest sectors represented in Orbis and accounts for more than 28,500 links. Fewer links are found in agriculture (509), energy (926), and water (601), in line with expectations: energy firms are relatively scarce, while firms in agriculture and water tend to be smaller and more locally owned.[17] Panel B reports the same descriptive statistics by affiliate sector. Although manufacturing remains the dominant sector, more than 35,000 links lack sectoral information at the affiliate level. This is consistent with the fact that many African firms are missing financial and economic variables in Orbis. Taken together, this evidence points to the use of the GUO sector when exploring sectoral heterogeneity and potential mechanisms.

Several papers provide methodological guidance on the usage and limitations of Orbis. Kalemli-Özcan et al. (2024) outlines best practices for sampling both financial and ownership data from Orbis Historical vintages, showing how to construct a panel of national business activity using unique Orbis identifiers. Rosati et al. (2020, 2024) provide a detailed statistical framework for handling Orbis ownership data. However, some caveats are also highlighted by Ribeiro et al. (2010), who note that the use of different national and local sources to collect business records can lead to discrepancies in units of analysis. In a sample of advanced economies, Bajgar et al. (2020) show that Orbis over represents mature firms, concluding that Orbis is best suited for cross-country analyses of multinationals or within-firm dynamics rather than population-wide firm distributions. In general, countries where financial information filing is mandatory tend to have more comprehensive data in the Orbis sample. If the inclusion of data in a business registry or statistical office is subject to a threshold, smaller firms may be excluded. Table A1 shows the foreign GUO-firm coverage in our sample. The top three countries in terms of ownership links are South Africa, Morocco, and Egypt, with 22,458, 7,087, and 4,734 ownership links, respectively.

2.2.2 Western Subnational Aid

Our data on subnational Western aid is sourced from GODAD, as introduced in Bomprezzi et al. (2024). The full dataset includes geographical information on aid projects of 19 bilateral donors from the OECD's CRS: 18 European countries and the United States. The data is geocoded us-

[17] The communication sector accounts for 4,950 links, the mining sector for 5,522, the retail sector for 4,335, the transport sector for 3,136, other sectors account for 22,532 links, and 202 links correspond to GUOs for which sector information is not available.

ing project descriptions and titles as reported in the CRS, which are processed through a Natural Language Processing (NLP) pipeline to identify geographic entities within the recipient country.[18] The raw data contain financial information on commitments and disbursements (in US$) as well as information on project characteristics, such as implementing agencies, scope, and project descriptions. In our empirical analysis, we use information on project locations to create ADM1 and ADM2 measures of aid flows by each of the donors in our study. The CRS provides project-level data on OECD donors beginning in 1973. We use aid flows from 2007 to 2019 to match the coverage of our firm ownership data and to exclude COVID-19 years.

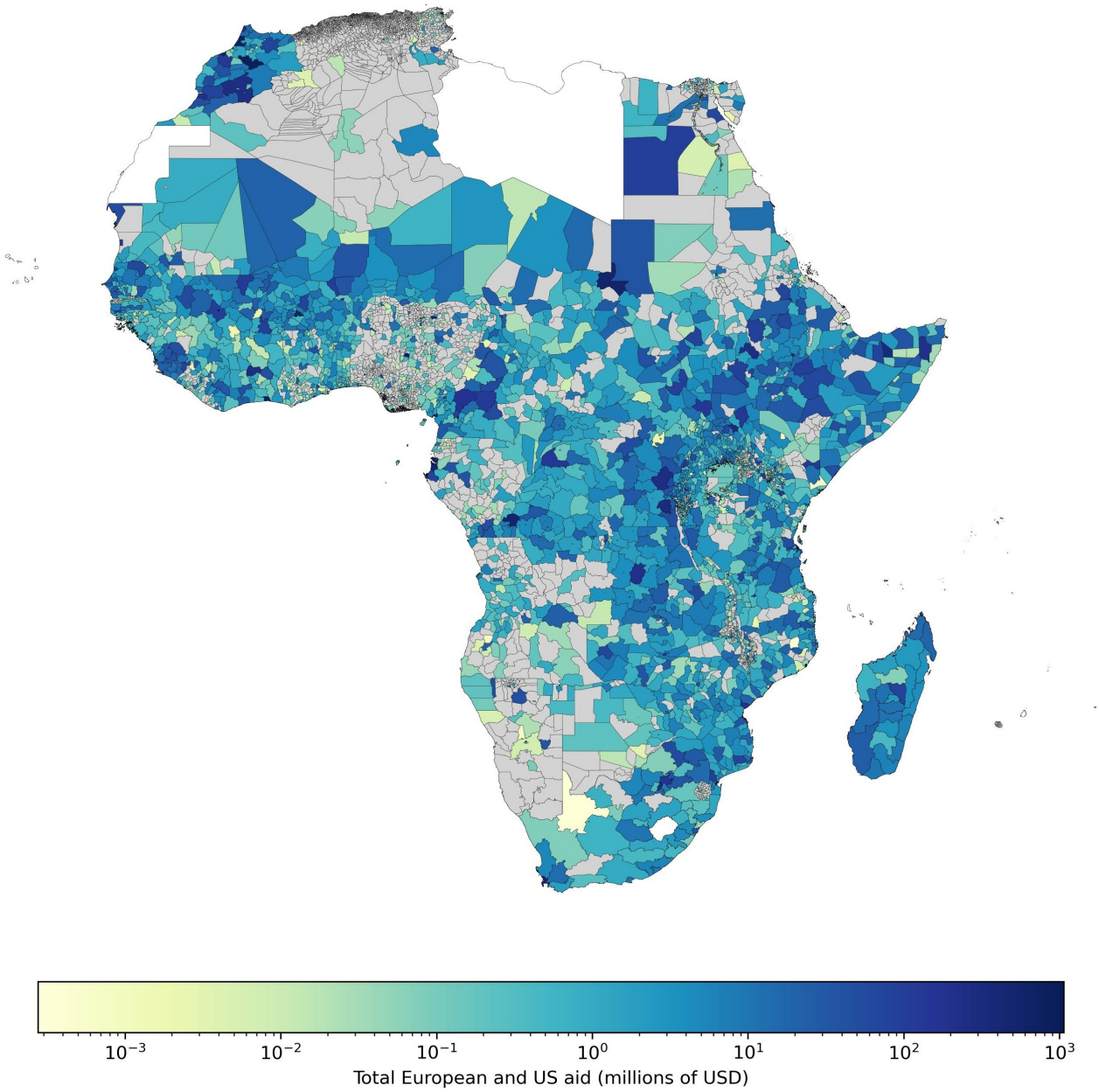
While GODAD offers the most comprehensive subnational coverage of development projects to date, it captures only a geocoded subset of Western project aid. There are two categories of potentially missing donor activities from our analysis. First, there are project which are not subnational in nature, such as general budget support, debt relief, or centrally implemented technical-assistance. The flow of these cross-sectoral aid activities could still be influenced by the presence of donor affiliates in an aid recipient country, regardless of where they are located. Second, there may be projects missing due to geocoding limitations. Bomprezzi et al. (2024) discuss this representativeness in detail, concluding that GODAD has better coverage with respect to other project level datasets like AIMS. Consequently, our analysis estimates the effects of donor commercial presence on localized development engagement.

Figure 2.2 shows the value of ODA commitments in million of US$ received by the African ADM2 regions from European countries and the United States. White areas indicate regions for which data are missing, grey areas represent regions that do not receive aid, and the darker the blue, the higher the amount of aid received. The top three recipients of aid are Morocco, the Democratic Republic of Congo, and Kenya, which received 4,530, 3,030, and 2,160 million US$, respectively. At a more granular level, the top three ADM2 recipient regions are the region of Dakar in Senegal, the region of Rabat in Morocco, and the region Starehe in Kenya with each receiving over 800 million US$. On average, ODA commitments amount to about 1.6 million US$ per African ADM2 region in our sample, although there is considerable variance, with the largest flows nearing 1 billion US$.[19]

[18] For a detailed breakdown of the geocoding process and an evaluation of the accuracy and representativeness of the data, see Bomprezzi et al. (2024).

[19] The largest registered commitment is recorded in Morocco in 2018, amounting to 800 million US$.

Figure 2.2: Total commitments in African ADM2 regions



Notes: The map shows the value of commitments, in millions of US$, allocated to African ADM2 regions by European countries and the U.S. from 2007 to 2019. Different shades of blue represent varying ranges of commitments, while grey areas indicate regions that did not receive aid. White regions represent areas for which data are missing.

We also examine the heterogeneity of aid across sectors. Figure A2 in Appendix A shows the distribution of aid commitments and disbursements by OECD-reported aid sectors, aggregated by macro-category. The largest category, both in terms of commitments and disbursements, is "So-

cial Infrastructure," which includes projects in health, education, governance, and sanitation. The second-largest category is "Economic Infrastructure," covering infrastructure projects related to transportation, energy, and communication. The smallest categories are "Production Infrastructure," covering industry-specific projects such as those in fishing, forestry, mining, industry, trade, and tourism, and the residual sector "Other."

To demonstrate the interaction between ownership links and aid in our data, Figure 2.3 shows the overlap between aid and ownership links for a donor-recipient country sample. In particular, the figure illustrates the total number of Spanish ownership links (represented by red arrows) and total aid commitments (depicted in blue regions) within Morocco's ADM2 areas.[20] It highlights that regions with stronger ownership links are also those that have received relatively more aid from Spain.

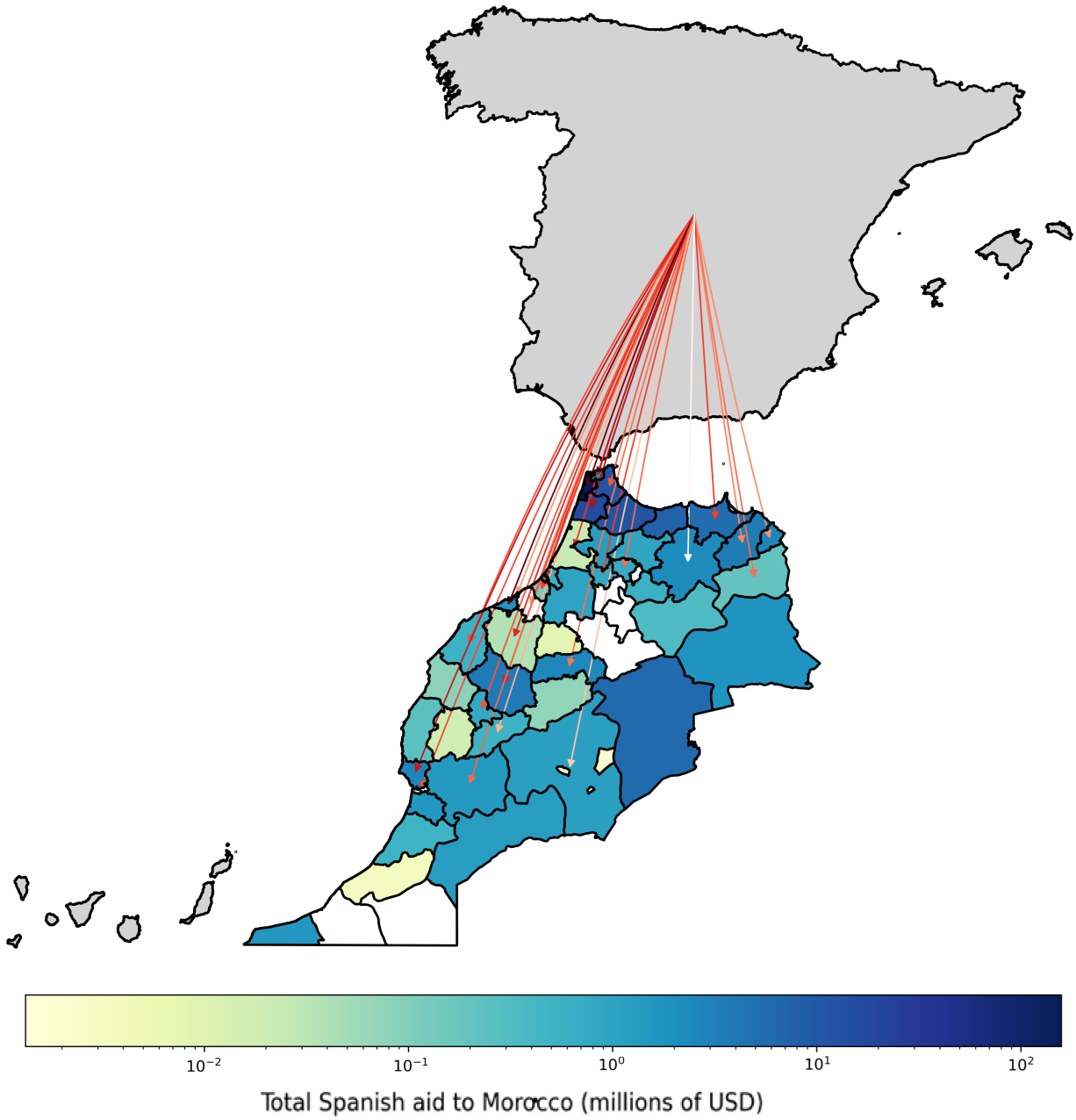
2.3 Empirical Strategy

In our baseline model, we examine how firm-level ownership ties impact the sub-national allocation of European and U.S. project aid in Africa. Specifically, we test whether the number of ownership ties between African firms in ADM2 region *r* of country *c* and European and U.S. firms in donor country *d* influences aid flows from the donor to the ADM2 region *r*. We regress aid flows (measured as the logarithm of aid commitments plus 1) on the total number of donor-specific ownership links between donor-country firms and recipient-region firms, as well as a set of observable time-varying determinants of aid, pair-level, donor-year, and region-year fixed effects. The pair fixed effects capture time-invariant, group-specific factors influencing subnational aid, such as geographic, cultural, and historical proximity. The donor-year and region-year fixed effects control for cyclical patterns in the provision and demand for aid. The main goal is to isolate the within-pair effect of an increase in economic ties, as measured by our firm-level variable. The full empirical model is presented in Equation 2.1:

$$log(Aid_{r,c,d,t}) = \beta Ownershiplink_{r,c,d,t-1} + \delta_{dr} + \tau_{rt} + \gamma_{dt} + \varepsilon_{r,c,d,t} \tag{2.1}$$

[20] Spain is selected as a representative donor due to its economic and geographic relevance in Africa.

Figure 2.3: Spanish ownership links and aid commitments in Morocco, 2007-2019



Notes: Red arrows indicate total ownership links from Spanish owners to Moroccan firms. Blue shading represents Spanish aid commitments across Moroccan ADM2 regions, with darker blue corresponding to higher aid allocations. Spain is depicted in grey.

where $log(Aid_{r,c,d,t})$ is the logarithm of aid commitments (plus 1) in constant 2014 US$ allocated to recipient region r of country c by donor d in year t, and $Ownershiplink_{r,c,d,t-1}$ is the number of owners of firms located in recipient region r of country c originating from the donor country d in

the previous year $t-1$. The lagging of ownership links by one year mitigates potential endogeneity issues.[21] δ_{dr} are donor-region pair fixed effects to account for time-invariant and group-specific factors that may influence aid allocation. Additionally, τ_{rt} and γ_{dt} are region-year and donor-year fixed effects, respectively, which account for time-varying heterogeneity in the demand and provision for aid. Standard errors are clustered at the recipient-donor level as it is the level of treatment.

Our specifications provide different perspectives on economically-determined aid allocation patterns. In line with the literature on aid allocation (Dreher et al., 2019), we additionally estimate a model which excludes region-donor and region-year dummies, allowing us instead to include a set of region-level controls. These controls capture the main, spatially defined, economic factors that are likely to influence aid distribution. Specifically, we include indicator variables which capture if a region contains a port, mine, oil, gas, or capital city in a given year. Regional connectivity is measured using road density, defined as the total kilometers of road per square kilometer km/km^2, while the logarithm of the area is used to account for the geographic size of the region. To capture economic development, we use the logarithm of mean nightlight emissions as in Li et al. (2020), a standard proxy for regional economic activity.[22] Lastly, we control for the logarithm of the total population to account for demographic differences across regions (CIESIN, 2018).[23]

Moreover, as highlighted in Dreher et al. (2019), omitting region fixed effects allows us to leverage between-region variation, which can be particularly relevant for measuring the role of ownership links in aid allocation when these links exhibit limited within-region variation. This is especially true in cases where changes in ownership links occur infrequently. Alternatively, controlling for donor-recipient region pair fixed effects provides a more robust approach, accounting for unobservable factors such as political, cultural, or economic ties between a donor country and a recipient region. However, both approaches may still face challenges related to reverse causality, as firms in the donor country might choose to invest in regions that receive more aid, and omitted variables at the region-donor-year level, such as specific trade patterns. We address these issues using an instrumental variable strategy, as discussed in Section 2.6.[24]

[21] As a robustness check, we consider aid disbursements instead of commitments.

[22] As is standard, we add 0.01 before applying the logarithm to the nightlight variable to avoid undefined transformations due to the large number of zeros.

[23] Unless otherwise specified, all control variables are sourced from Bomprezzi et al. (2024).

[24] Summary statistics on the variables used in the regressions are reported in Table A2. Definitions and sources of the variables are presented in Table A4.

2.4 Results

We start presenting the results of our baseline empirical strategy. Columns 1 to 4 of Table 2.1 present the results when the analysis is conducted at the ADM2 level, while columns 5 to 8 show results at the ADM1 level. For the ADM2 analysis, column 1 includes ADM2-donor pair fixed effects and column 2 presents the preferred specification by adding donor-year and region-year dummies, as the stricter set of fixed effects is included. Then, column 3 removes ADM2-year dummies to show that the effect is not driven by the presence of other donor links, the logarithm of the population, and the nightlight emissions. These changes are essential to show that our results are driven by donor specific link, and not by other proxy of economic development of the region. Finally, column 4 incorporates the region-level controls outlined in the previous section while excluding ADM2-donor pair and region-year fixed effects. Across all four specifications, the number of ownership links originating from donor countries in region r is positively and significantly associated with higher aid commitments. Our preferred specification in column 2 yields an effect associated with a 2.7% higher level of aid commitments per additional link which corresponds to about 712 US$ given the average commitment of 26,387 US$. In column 3, we furthermore explicitly control for the possibility that our results are driven by the overall level of economic activity in a region. *Other donor links* measures the total number of affiliates from all other donors in an African ADM2 region in a given year. The coefficient is positive, but not significant and very close to zero, confirming that what truly matters in determining bilateral aid flows is the economic tie with the donor rather than the mere presence of foreign firms in the region.

In the specification without dyad fixed effects but which includes all controls (column 4), the coefficient for total ownership links is larger. Here, higher level of population, geographic area size, the presence of the capital city and ports, and the road density are all significantly associated with higher aid commitments. In this specification we also find that the presence of other donor firms is associated with a higher amount of aid to the region, but the coefficient is almost zero. Surprisingly, the presence of oil or gas as well as a higher level of development of the region—proxied by the logarithm of nightlight emissions—negatively affects aid. However, it is worth noting that the coefficient on nightlights is close to zero, and that regional development may be partly captured by the coefficient on the presence of other donor links. Turning to the analysis at the ADM1

Table 2.1: Firm linkages and total aid commitments, 2007-2019

	log(Commitments)							
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2	(5) ADM1	(6) ADM1	(7) ADM1	(8) ADM1
Total ownership links	0.0294***	0.0267***	0.0276***	0.0490**	0.0198***	0.0191***	0.0357**	0.0375**
	(0.00804)	(0.00801)	(0.00741)	(0.0203)	(0.00737)	(0.00637)	(0.0148)	(0.0157)
Other donor links			0.000866	0.00258***			-0.00199**	-0.000202
			(0.00119)	(0.000790)			(0.000885)	(0.000613)
(log) Population			0.0215	0.0664***			0.0632	0.495***
			(0.0187)	(0.00212)			(0.160)	(0.0216)
(log) Nightlight			-0.00273**	-0.00335**			-0.0293**	-0.141***
			(0.00139)	(0.00133)			(0.0120)	(0.0127)
Capital city				2.094***				2.021***
				(0.124)				(0.133)
Mine				0.0204				-0.0866*
				(0.0146)				(0.0520)
Oil/gas				-0.0894***				-0.385***
				(0.00688)				(0.0600)
(log) Area				0.0312***				0.0365**
				(0.00240)				(0.0160)
Port				0.198***				0.178***
				(0.0293)				(0.0671)
Road density				0.139***				0.463***
				(0.0225)				(0.103)
Observations	1,423,850	1,423,850	1,403,596	1,403,596	170,314	170,314	165,868	165,868
Avg. aid comm.	26,387	26,387	26,025	26,025	296,309	296,309	2970,58	297,058
R-squared	0.400	0.437	0.404	0.053	0.511	0.552	0.239	0.160
Region x Donor	Yes	Yes	Yes		Yes	Yes	Yes	
Region x Year		Yes				Yes		
Donor x Year		Yes	Yes	Yes		Yes	Yes	Yes

Notes: The dependent variable is the log of commitments (plus 1) given to region r in year t by donor d. Columns 1-4 (5-8) refer to ADM2 (ADM1) regions. *Total ownership links* is the number of ownership links between the region r and the donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 and 5-7 include region-donor dummies, columns 2-4 and 6-8 also include donor-year dummies, columns 2 and 6 add region-year dummies, and columns 4 and 8 include controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the region-donor level. *** p<0.01, ** p<0.05, * p<0.1

level (columns 5-8), similar conclusions are reached. However, the coefficient for total ownership links is smaller in absolute terms across three out of four specifications. ADM1 regions represent larger geographic areas, where our measure of aid allocation is more aggregated with respect to the smaller ADM2 regions. Consequently, greater measurement noise in our outcome variable may lead to attenuation bias, weakening the estimated effects.

Although the comparison between ADM2 and ADM1 estimates points to a potential role for measurement noise and aggregation-driven attenuation bias, it is important to note that firms' economic interests may extend beyond the borders of a given ADM2 unit, especially when their activities are located close to administrative boundaries. In this case, firms located near the border of an ADM2

region may have an incentive to influence or benefit from aid allocated to neighboring ADM2 units, even though such aid is not formally assigned to their own region of location. This may generate cross-boundary spatial spillovers that are not captured in our baseline specifications. Although moving to the more aggregated ADM1 level partly mitigates this issue, it may also obscure localized relationships by averaging across larger and more heterogeneous geographic areas.

To explicitly account for potential spillovers across administrative borders, we complement our baseline analysis with a spatial econometric approach. Specifically, we construct a contiguity-based spatial weights matrix, following the conditions indicated in LeSage and Pace (2009). The resulting matrix has dimension $N \times N$, where N denotes the total number of ADM2 regions in our sample, and each row and column corresponds to a specific ADM2 unit. For any given pair of regions (r, j), the generic element of the matrix is set equal to one if the two regions share either a common border or a common vertex, and to zero otherwise.[25] In this way, each region r is allowed to be directly connected not only to its side-adjacent neighbors but also to diagonally adjacent ones, capturing a broader notion of geographical proximity. The matrix is then row-standardized so that the weights in each row sum to one. This transformation ensures that the spatially lagged variables can be interpreted as averages of neighboring regions' outcomes and that the magnitude of the spatial effects is comparable across regions with different numbers of neighbors. Using this matrix, we construct the spatial spillover variable as:

$$spillover_{r,c,d,t} = \sum_{j \neq r} w_{r,j} Ownershiplink_{j,c,d,t} \tag{2.2}$$

where $w_{r,j}$ is the weight assigned to the neighboring region *j* of region *r*, and $OwnershipLink_{j,c,d,t}$ denotes the number of ownership links that donor d has in ADM2 region j of country c in year t, with $j \neq r$. Thus, $Spillover_{r,c,d,t}$ represents the row-standardized average number of ownership links held by the same donor *d* in the ADM2 regions neighboring region r in year t.

Table 2.2 reports the results of estimating Equation 2.1 augmented with the inclusion of the spillover variable at year $t - 1$. As shown, the spillover coefficient is positive across all specifications and similar in magnitude to the ownership link coefficient. However, it consistently fails to reach statis-

[25] It is worth noting that the elements on the main diagonal of the spatial weights matrix are all zeros, as these entries would correspond to a region being a neighbor of itself, which is excluded by construction.

Table 2.2: Firm linkages, spillover, and total aid commitments, 2007-2019

	log(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
Total ownership links	0.028***	0.025***	0.026***	0.047**
	(0.008)	(0.008)	(0.007)	(0.020)
Spillover	0.023	0.024	0.021	0.023*
	(0.015)	(0.015)	(0.014)	(0.013)
Other donor firms			0.001	0.003***
			(0.001)	(0.001)
(log) Population			0.021	0.066***
			(0.019)	(0.002)
(log) Nightlight			-0.003*	-0.004***
			(0.001)	(0.001)
Capital city				2.093***
				(0.124)
Mine				0.017
				(0.015)
Oil/gas				-0.089***
				(0.007)
(log) Area				0.031***
				(0.002)
Port				0.198***
				(0.029)
Road density				0.138***
				(0.023)
Observations	1,423,850	1,423,850	1,403,596	1,403,596
R-squared	0.400	0.437	0.404	0.053
Region x Donor	Yes	Yes	Yes	
Region x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the log of commitments (plus 1) given to region r in year t by donor d. Columns 1-4 (5-8) refer to ADM2 (ADM1) regions. *Total ownership links* is the number of ownership links between the region r and the donor d in year $t-1$, *Spillover* is the average number of ownership links held by donor d in the ADM2 neighboring region r in year $t-1$, and *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM2 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the region-donor level. *** p<0.01, ** p<0.05, * p<0.1

tical significance at conventional confidence levels, except in the specification reported in column 4.[26] These results suggest that ownership links held by the same donor in neighboring regions may have some influence on aid allocation in the ADM2 region under analysis, but the effect is relatively

[26]As a robustness check, we also constructed a spatial weights matrix restricting neighboring regions to those within the same country. This accounts for the possibility that cross-border barriers may prevent firms located near a border from influencing aid in adjacent regions, as operating in a neighboring country may involve additional administrative, legal, or logistical difficulties. However, the results remain very similar and continue to be statistically insignificant.

weak and imprecisely estimated. In sum, our findings provide, to the best of our knowledge, the first systematic evidence that donor-country commercial presence is correlated with the subnational allocation of bilateral foreign aid in Africa.

2.4.1 Heterogeneous Effects

We argue that the effect operates through a donor-specific channel, with aid flows responding to the presence of commercial interests from the same donor. We therefore uncover interesting differences among donors by splitting our sample (Alesina & Dollar, 2000). Specifically, following Alesina and Dollar (2000), we group the so-called Nordic countries (Denmark, Finland, Norway, and Sweden), as these countries exhibit similarities in aid allocation behavior. We then focus on major donors, defined as those providing total aid commitments above the median value. These donors are Belgium, France, Germany, Italy, the Nordic group, Spain, the United Kingdom, and the United States. Following Alesina and Dollar (2000), we expect to find significant differences between donors. Indeed, certain donors—most notably the Nordic countries—tend to be more responsive to "appropriate" development incentives, such as recipient countries' income levels or institutional quality. Accordingly, we estimate a specification similar to that in Equation 2.1 separately for each donor, adjusting the fixed effects to account for the presence of a single donor country. In particular, we replace ADM2–donor fixed effects with ADM2 fixed effects, as the donor is now unique, and substitute region–year dummies with recipient country–year dummies, as otherwise we would include a dummy for each observation. By contrast, when focusing on the group of Nordic countries, we can retain the baseline fixed-effects structure specified in Equation 2.1. This approach allows us to examine how the relationship between ownership links and aid commitments varies across donors, providing insights into donor-specific aid allocation strategies and differences in geographical targeting and sectoral preferences.

Table 2.3 presents the results. As can be seen, France (column 2), the United Kingdom (column 7), and the U.S. (column 8), give more aid to regions in which they have an additional ownership link. The highest coefficient is observed for France, for which an additional ownership link is associated with 18.6% more aid. Belgium, Germany, Italy, the Nordic countries, and Spain do not give more aid to regions with a higher number of affiliates, suggesting a more "appropriate" behavior.

Table 2.3: Firm linkages and total aid commitments by major donors, 2007-2019

	log(Commitments)							
	(1) Belgium	(2) France	(3) Germany	(4) Italy	(5) Nordic	(6) Spain	(7) UK	(8) USA
Total ownership links	-0.008	0.171***	0.041	-0.065	0.056	-0.044	0.02***	0.047***
	(0.054)	(0.064)	(0.031)	(0.055)	(0.077)	(0.045)	(0.004)	(0.011)
Observations	74,940	74,940	74,940	74,940	299,760	74,940	74,930	74,940
Avg. aid comm.	26,287	229,054	57,710	14,473	11,209	9,578	25,915	67,630
R-squared	0.471	0.403	0.387	0.418	0.515	0.497	0.375	0.465
Region FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recipient country x Year	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Region x Donor					Yes			
Region x Year					Yes			
Donor x Year					Yes			

Notes: The dependent variable is the logarithm of aid commitments (plus 1) given to ADM2 region r of country c in year t by donor: Belgium (column 1), France (column 2), Germany (column 3), Italy (column 4), the Nordic countries (column 5), Spain (column 6), the USA (column 7), and the UK (column 8). *Total ownership links* is the number of total ownership links between region r of country c and donor d in year $t-1$. All columns except column 5 include ADM2 and recipient country–year fixed effects. Column 5 includes ADM2–donor fixed effects, together with region–year and donor–year dummies. Standard errors (in parentheses) are clustered at the ADM2 level in all columns except column 5, in which they are clustered at the ADM2–donor level. *** p<0.01, ** p<0.05, * p<0.1

These results are consistent with a mechanism in which donor firms shape the spatial allocation of project aid through localized complementarities. Firm affiliates close informational gaps and provide strategic incentives for donors to fund place-specific projects such as infrastructure, training, or service delivery that support or protect existing commercial activity. While it is possible that a similar mechanism is at play at the macro level, leading to greater budget-support or policy-lending operations, these are more a function of government negotiations and fiscal needs, rather than firm specific targeting.

Finally, we examine how the results vary across different aid sectors. Specifically, we re-estimate our baseline specifications by distinguishing among types of aid commitments. Table 2.4 reports the estimates for aid directed toward economic infrastructure (column 1), production infrastructure (column 2), social infrastructure (column 3), and other types of aid (column 4). As shown, only the social infrastructure aid is positive and significant. The next section presents the mechanism driving our results.

Table 2.4: Firm linkages and total aid commitments by aid sector, 2007-2019

	log(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
Total ownership links	0.005	0.002	0.024***	0.006
	(0.003)	(0.002)	(0.009)	(0.006)
Observations	1,423,860	1,423,860	1,423,860	1,423,860
Avg. aid comm.	7,530	2,050	8,658	2,103
Region x Donor	Yes	Yes	Yes	Yes
Region x Year	Yes	Yes	Yes	Yes
Donor x Year	Yes	Yes	Yes	Yes
Aid sector	Economic	Production	Social	Other

Notes: The dependent variable is the logarithm of aid commitments (plus 1) given to ADM2 region r of country c in year t by donor d, distinguished by aid sector: economic (column 1), production (column 2), social (column 3), and other (column 4). *Total ownership links* is the number of total ownership links between region r of country c and donor d in year $t-1$. All columns include ADM2 x donor, ADM2 x year, and donor x year fixed effects. Standard errors (in parentheses) are clustered at the ADM2-donor level. *** p<0.01, ** p<0.05, * p<0.1

2.5 Mechanism

Our baseline results provide, to the best of our knowledge, the first systematic evidence on the empirical relationship between donor-country commercial presence and the allocation of bilateral foreign aid at the subnational level. However, this pattern raises an important question on the underlying mechanism: why do commercial ties shape aid flows? In this section, we investigate the mechanisms that may explain why donor-country commercial presence correlates with the subnational allocation of bilateral foreign aid in Africa. We focus on two channels in particular: informational asymmetries, which may allow firms to transmit superior local knowledge to donor governments, and strategic considerations linked to the nature of the firms operating abroad.

2.5.1 Information channel

When allocating subnational foreign aid projects, donors face informational constraints on recipient needs, risks, institutions, and implementation capacity. In other words, donors wish to fund effective aid projects, but have limited information on where or how to deploy them. Donor-country subsidiaries may reduce these information asymmetries through their established networks and local knowledge that can inform donor decision-making in the aid allocation process. Previous research

has shown that aid is frequently directed toward better-off or more accessible regions, in part because donors have more reliable information (Briggs, 2017; Dietrich, 2013). If donor-country firms serve this informational role, we should expect the effect of firm linkages on aid to be stronger in areas with limited prior donor engagement.

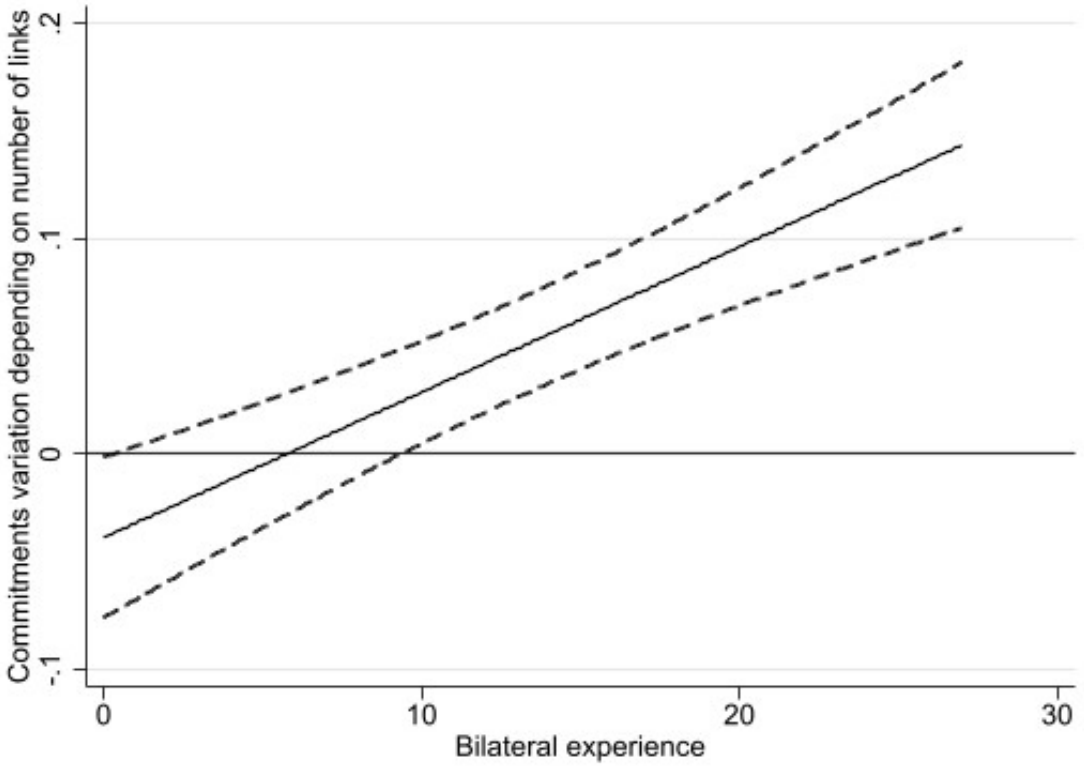
To test this hypothesis, we use prior bilateral aid engagement as a proxy for informational familiarity. This variable, commonly adopted in the literature (Dreher et al., 2017), is defined as the number of years since a donor country first provided aid to a specific ADM2 region. If firms convey information to their home countries about regional development conditions, we should expect a downward-sloping marginal effect of bilateral experience on aid commitments, conditional on the number of ownership links present in the region. Specifically, when a donor country has never provided aid to a region (i.e., bilateral experience equals zero), the presence of firms from that country is expected to have a positive effect on aid flows, as firms act as the primary source of information in previously unserved areas. Conversely, the marginal effect of an additional year of bilateral experience, conditional on the number of ownership links, should be negative, since information transmission is primarily driven by firms rather than by accumulated aid experience.

Figure 2.4 shows the marginal changes in aid commitments conditional on the number of donor links in a region, across different levels of bilateral aid experience. When bilateral experience equals zero, the variation in average aid commitments received by an African region—conditional on the number of firms linked to the donor country—is even negative, suggesting that firms alone do not provide sufficient information for donors to allocate aid to previously unserved areas. As bilateral experience increases, however, the average level of aid commitments also rises, conditional on firm presence. This pattern indicates that firms continue to provide additional value even when donors have already accumulated knowledge about the region through repeated aid engagement. Overall, these results suggest that firms and donors' informational familiarity act as complements, rather than substitutes, in shaping aid allocation decisions.

2.5.2 Strategic firms

Our results suggest that the role of firms extends beyond simply bridging information gaps. Instead, their presence may reflect strategic motives on the part of donor governments. Donors may allo-

Figure 2.4: Ownership links, bilateral experience, and total aid commitments



Notes: The solid line shows the log amount of aid commitments (plus 1) conditional on the number of ownership links, for each number of years in which a donor country has provided aid to the region (bilateral experience). The dashed lines represent 90% confidence intervals, with standard errors clustered at the ADM2–donor level.

cate aid to African regions in ways that complement or protect their domestic commercial interests. Firms may be "strategic" either because of their economic weight—making them salient for employment, fiscal revenues, and domestic political considerations—or because they provide essential infrastructure and services that underpin the donor country's own economy. These firms—typically large by construction—may therefore create incentives for donors to prioritize regions where their major corporate actors maintain a commercial footprint.

Distinguishing which multinationals are "strategic" for their home country requires focusing on industries whose activities shape macro-structural economic capacity and state power. Firms in communication–construction and energy–mining fit this definition because they develop and operate transport networks, energy systems, and extractive infrastructures that underpin long-run pro-

ductivity and geopolitical influence (Dreher et al., 2021; Farrell & Newman, 2019).[27] Their international expansion typically relies on local affiliates, concessionary regimes, and sustained engagement with host governments, reflecting the tight coupling between firm behavior and state interests in infrastructure-intensive sectors (O'Sullivan et al., 2017; Overland et al., 2020). By contrast, manufacturing multinationals are generally embedded in global production networks (Antràs, 2016; Baldwin, 2016) and operate abroad primarily for market-access or cost advantages, with limited implications for sovereign capabilities or geoeconomic leverage. With the exception of a few high-technology or critical-supply-chain segments, manufacturing rarely exhibits the political sensitivity or systemic relevance associated with strategic industries. This distinction motivates our focus on infrastructure-oriented European multinationals when examining the political economy of Europe–Africa economic relations.

More specifically, we examine three channels. First, we distinguish whether the relevant firm is state-owned (SOE), capturing cases in which commercial operations are more directly aligned with government objectives. Second, we consider firm size, as larger multinationals are more likely to have macroeconomic relevance and political visibility. Third, we identify firms operating in infrastructure-intensive sectors—such as communication, construction, energy, and mining—which are often regarded as strategically important. Because these firms are typically large by construction, we further differentiate among them by size to isolate sector-specific strategic effects from those driven purely by scale.

Our first test follows this logic by exploiting ownership data on donor-country GUOs to identify which firms are, directly or indirectly, owned by public-sector entities. Because aid is not measured at the firm level and is instead aggregated at the ADM2 level, we incorporate it into our baseline empirical specification by computing the total number of state-owned ownership links separately from private-owned links. Table 2.5 reports the baseline results distinguishing between privately owned and state-owned links.[28] As shown, the coefficient for private ownership links is positive and statistically significant across all specifications. In contrast, the coefficient for state-owned

[27] For example, in the French case, major home-country firms such as TotalEnergies and Vinci have long-standing operations across several African regions; likewise, Italy's ENI and Salini Impregilo (Webuild) maintain extensive activities in countries such as Mozambique, Egypt, and Ethiopia. The presence of such dominant multinationals may plausibly generate incentives for donor governments to favor regions where these firms operate.

[28] To maintain consistency with the main analysis, we classify as state-owned only those links in which a donor country holds at least 50.01% of ownership.

Table 2.5: Ownership links, state-owned GUOs, and total aid commitments

	log(Commitments)			
	(1)	(2)	(3)	(4)
Private links	0.029***	0.026***	0.027***	0.045**
	(0.008)	(0.008)	(0.007)	(0.019)
State-owned links	0.098	0.119	0.086	0.661***
	(0.099)	(0.088)	(0.098)	(0.251)
Other donor firms			0.001	0.003***
			(0.001)	(0.001)
(log) Population			0.022	0.066***
			(0.019)	(0.002)
(log) Nightlight			-0.003**	-0.003**
			(0.001)	(0.001)
Capital city				2.088***
				(0.123)
Mine				0.021
				(0.015)
Oil/gas				-0.089***
				(0.007)
(log) Area				0.031***
				(0.002)
Port				0.196***
				(0.029)
Road density				0.139***
				(0.022)
Observations	1,423,850	1,423,850	1,403,596	1,403,596
R-squared	0.400	0.437	0.404	0.054
Region x Donor	Yes	Yes	Yes	
Region x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the logarithm of aid commitments (plus 1) given to region r of country c in year t by donor d. *Private links* is the number of private ownership links that the region r of country c has with donor d in year $t-1$, and *State-owned links* is the number of state-owned ownership links that the region r of country c has with donor d in year $t-1$. Columns 1-3 include ADM2 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

links is positive and significant only when dyad-fixed effects are excluded (column 4). This pattern likely reflects the very limited variability of the state-owned variable, which is largely absorbed by dyad fixed effects, leading to attenuation of the estimated coefficient. Indeed, descriptive statistics confirm that state-owned enterprises represent only a very small fraction of total ownership links. Out of 74,522 ownership links, only 784 (approximately 1%) involve state-owned enterprises, while the remaining 73,738 links are associated with private firms. Moreover, state-owned links are highly concentrated geographically: approximately 53% originate from France and 25% from Germany.

This concentration suggests that any estimated effect for state-owned enterprises is driven by a small number of countries. Overall, this evidence indicates that the distinction between state-owned and private firms has limited empirical relevance in the European context, where state-owned enterprises are relatively rare. Consequently, the strategic channel operating through state-owned enterprises is unlikely to be the primary mechanism driving our main results.

Second, we examine whether results vary with firm size, since larger multinationals are more likely to carry macroeconomic relevance and political visibility at home. To this end, we classify private ownership links according to the size of the GUO, measured by the number of employees. Specifically, we define a firm as "large" if its number of employees falls within the top 25%, 15%, 10%, or 5% of the GUO employment distribution.[29] This strategy allows us to assess whether the estimated effects are driven by increasingly large and visible multinational firms. In particular, we expect the coefficient associated with large firms to be statistically significant and to increase in magnitude as the size threshold becomes more restrictive, while no significant effect is expected for non-large firms. Within the same specification, we also include a separate coefficient for state-owned ownership links. Although limited in number, SOEs may exert influence independently of firm size due to their political relevance. Estimating their effect separately therefore prevents this influence from being mechanically absorbed into the coefficient for non-large private firms.

Table 2.6 reports the results. The coefficient for large private ownership links is positive and statistically significant across all specifications, while the effect of non-large links is consistently close to zero and never statistically significant. Moreover, the magnitude of the effect is higher as the threshold for defining large firms tightens from the top 25% (column 1) to the top 10% (column 3), suggesting that the largest multinationals exert a stronger influence on aid from the donor country of origin. When focusing on the top 5% of ownership links (column 4), the coefficient remains larger than in the top 25% case, although slightly smaller than in the top 10% specification. This pattern is unsurprising, as the top 5% definition includes substantially fewer links, reducing the number of observations driving the estimate. Overall, these results indicate that only large ownership links matter, consistent with the idea that politically visible and economically significant multinationals are the ones shaping donor-country aid decisions.

[29] Firms for which information on the number of employees is unavailable are classified as small.

Table 2.6: Firm linkages and total aid commitments, large private GUO and SOE

	log(Commitments)			
	(1)	(2)	(3)	(4)
Large private links	0.034**	0.031**	0.072**	0.056*
	(0.014)	(0.015)	(0.031)	(0.032)
Not large private links	-0.028	0.009	-0.008	0.008
	(0.028)	(0.027)	(0.017)	(0.015)
State-owned links	0.141	0.126	0.126	0.126
	(0.087)	(0.087)	(0.083)	(0.086)
Observations	1,423,850	1,423,850	1,423,850	1,423,850
Avg. aid comm.	26,387	26,387	26,387	26,387
R-squared	0.437	0.437	0.437	0.437
Region x Donor	Yes	Yes	Yes	Yes
Region x Year	Yes	Yes	Yes	Yes
Donor x Year	Yes	Yes	Yes	Yes
Large definition	Top 25%	Top 15%	Top 10%	Top 5%

Notes: The dependent variable is the log of commitments (plus 1) given to ADM2 region r in year t by donor d. *Large private links* is the number of large private links between region r and donor d in year $t-1$, while *Not large private links* is the total number of non-large private links between region r and donor d in year $t-1$. *State-owned links* is the number of state-owned ownership links between region r and donor d in year $t-1$. All columns include region–donor fixed effects, donor–year dummies, and region–year dummies. In columns 1–4, large ownership links are defined as those in the top 25, 15, 10, and 5 percent of the distribution of GUO employment, respectively. Standard errors (in parentheses) are clustered at the ADM2 region–donor level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Finally, we adopt an alternative approach that aims to capture strategic considerations more directly by distinguishing firms operating in infrastructure-intensive sectors which are commonly regarded as strategically important for donor countries.[30] To this end, we aggregate sectors in order to group activities with similar economic purposes and to avoid sectors containing only a small number of ownership links, which could lead to imprecise estimates. As already described in Section 2.2.1, Western firms are not homogeneously distributed across sectors, but are instead heavily concentrated in manufacturing. We therefore group the energy, mining, and water multinationals, as they operate in sectors related to natural resources. We then group the communication, construction, and transport sectors, as they are infrastructure-based providing essential network and mobility services that underpin economic activity. Finally, we combine the retail and agriculture sectors, as they are mainly related to food production and distribution. Although the distribution of links remains unbalanced in favor of the manufacturing and residual sectors, this approach allows us to avoid

[30]For example, as reported by The Economist (2025c), the Trump administration has offered the Zambian government inducements to fast-track mining projects, has tied military aid to mineral exploitation in Ukraine, and is expected to sign a similar agreement with the Democratic Republic of Congo.

estimates whose results would be driven by a very small number of links.[31] Finally, this grouping strategy is also useful because it further rebalances the sectoral distribution when focusing only on the top 10% of large firms, which is the GUO size classification for which we observe the largest effect in Table 2.6.[32]

Table 2.7 reports the results obtained when distinguishing affiliates by their GUO sector group (column 1) and when focusing only on the top 10% of large firms by sector (columns 2). As shown, when considering all firms, the only positive and statistically significant effects are found for links in the infrastructure and manufacturing sectors (column 1). When restricting the sample to the top 10% largest firms, a significant effect also emerges for firms operating in the residual sector (column 2). No significant effect is detected for links in the resource-based sectors, possibly reflecting the relatively small number of such links and the limited variation they exhibit. By contrast, ownership links in manufacturing are substantially more numerous and heterogeneous, which may increase their explanatory power and contribute to the detection of statistically significant effects.

Overall, these results highlight the role of large and strategically important ownership links, particularly those in infrastructure-based sectors providing essential network and mobility services, in shaping the allocation of Western aid in Africa. The next section presents some robustness checks.

2.6 Robustness

In this section, we test the robustness of our findings through a series of sensitivity analyses, including the use of an IV strategy, alternative specifications, and tests for heterogeneous effects.

2.6.1 Identification

Potential concerns in our baseline estimates arise from endogeneity due to reverse causality and omitted variables at the region-donor-year level. Specifically, aid allocation is not random, as aid tends to be disproportionately directed toward poorer regions, while firms are more likely to locate

[31] The aggregation results in 7,049 links in the resources group, 11,305 in the infrastructure group, and 4,844 in the food group.

[32] For the top 10% largest firms, the aggregation results in 18,255 links in manufacturing, 4,248 in the resources group, 5,467 in infrstructure, 1,236 in the food group, and 4,580 in the residual group.

Table 2.7: Firm linkages and total aid commitments, by sector and SOE

	log(Commitments)	
	(1)	(2)
	ADM2	ADM2
Food links	-0.107	-0.153
	(0.091)	(0.149)
Infrastructures links	0.210***	0.335**
	(0.078)	(0.150)
Manufacturing links	0.085***	0.092**
	(0.029)	(0.043)
Resources links	-0.015	0.005
	(0.030)	(0.029)
Other links	0.009	0.111***
	(0.011)	(0.036)
Not large links		-0.015
		(0.015)
State-owned links	0.058	0.086
	(0.074)	(0.069)
Observations	1,423,850	1,423,850
R-squared	0.437	0.437
Region x Donor	Yes	Yes
Region x Year	Yes	Yes
Donor x Year	Yes	Yes
Large definition	All	Top 10%
Type of aid	All	All

Notes: The dependent variable is the log of commitments (plus 1) given to ADM2 region r in year t by donor d. All independent variables of interest, unless otherwise specified, refer to private ownership links. *Food links* denotes the number of ownership links in the agriculture and retail sector between region r and donor d in year $t-1$. *Infrastructures links* denotes the number of ownership links in the communication, construction, and transport sector between region r and donor d in year $t-1$. *Manufacturing links* denotes the number of ownership links in the manufacturing sector between region r and donor d in year $t-1$. *Resources links* is the number of ownership links in the energy, mining, and water sectors between region r and donor d in year $t-1$. *Other links* denotes the number of ownership links between region r and donor d in year $t-1$ that belong either to residual sectors or to sectors for which information is unavailable. *Not large links* is the total number of non-large ownership links between region r and donor d in year $t-1$. *State-owned links* is the number of state-owned ownership links that the region r of country c has with donor d in year $t-1$, independently of their size. All columns include region–donor fixed effects, donor–year dummies, and region–year dummies. Column 1 does not distinguish links by their size, while in column 2 sectoral links are defined as those in the top 10% of the distribution of GUO employment. Standard errors (in parentheses) are clustered at the ADM2 region–donor level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

in relatively richer areas. This pattern is confirmed by the results reported in column 3 of Table 2.1, where economic activity is proxied by nighttime satellite light intensity, a widely used measure of regional GDP in settings where conventional data are imprecise (Henderson et al., 2012). Such asymmetric allocation pattern may generate a negative correlation between aid and firm presence that is unrelated to the underlying causal relationship. As a consequence, the OLS estimates are

likely to be biased downward and may underestimate the true effect of firms on aid. At the same time, unobserved donor-region time-varying factors, such as changes in trade relationships or in donor-region strategic interests, may jointly affect both aid allocation and firms' investment decisions, further biasing the OLS results. To address these issues, we re-estimate Equation 2.1 using an instrumental variable approach. We rely on a shift-share IV, following the methodology outlined by Sonno (2025).

The strategy consists of instrumenting the number of European and U.S. firms' affiliates in African regions by a measure of the financial health of the parent companies. The logic is that the activity of a multinational's foreign affiliate is determined not only by local conditions but also by the financial stability of its owner company. When a credit shock hits a parent company (based in the donor country), it can restrict its ability to support its affiliates (i.e., opening or closing them).

As in Sonno (2025), we use a three-part IV, which introduces variation at the firm, year, and region level. First, we interact the parent's firm *m* dependence on external credit during the previous decade ($dep^{m}_{97,06}$) with a measure of international credit availability, cre_{t-2}.[33] Together, this comprises the shift component of our shift-share IV. The share component is instead given by $s^{m}_{r,c,d,2007}$, which measures the share of the affiliates of each parent m in the African region r of the country c from the donor d in 2007, capturing the presence of a specific donor firm in an African region at the beginning of our sample.[34]

The instrument captures how the global credit environment may affect the decisions of European and U.S. firms to expand their operations in African regions. Intuitively, it captures the differential effects of changes over time in the financial health of the parent companies, for parent firms with many vs. few affiliates in a region at the beginning of the sample. Thus, for each African region-donor-year, we construct an instrument for the number of ownership links, which is defined as the interaction between the share component and the shift component:

[33]The variable $dep^{m}_{97,06}$ is computed as the average liability-to-asset ratio (excluding equity) of each parent firm from 1997 to 2006, using information available in Orbis. This ratio reflects the firm's financial reliance on external credit. The measure of international credit availability cre_{t-2} is proxied by financial resources provided to the private sector globally, excluding African countries, and weighted by each country's GDP, which is retrieved from the World Development Indicators (WDI).

[34]Note that we compute the share in 2007, as it is the first year for which ownership data are available.

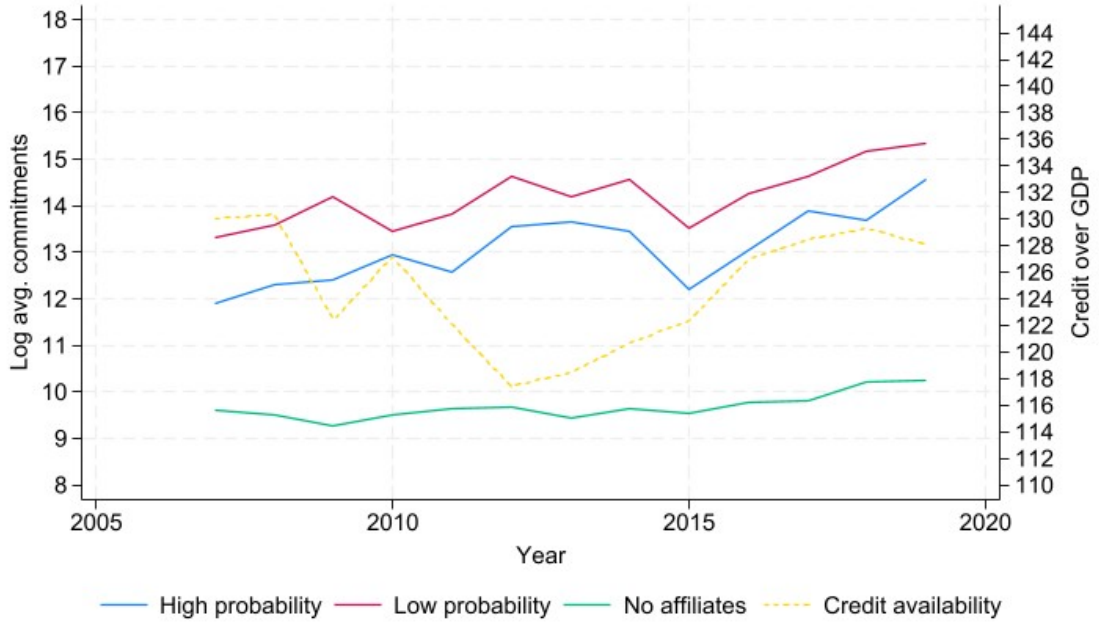
$$z_{r,c,d,t-1} = \sum_{m} s^{m}_{r,c,d,2007}(dep^{m}_{97,06} \times cre_{t-2}) \tag{2.3}$$

With Equation 2.3, we introduce variation at the donor, aid recipient region, and year level by first computing our measure for financial dependence at the firm level and aggregating up. The instrument can then be used to estimate the number of donor country-related affiliates in a given region in Africa at time t. The initial share of European and U.S. owners for each pair of African region and donor, $s^{m}_{r,c,d,2007}$, is used as a weighting strategy to maintain exogeneity. While the credit needs of firms in the donor countries may be correlated with aid (since firms might request assistance from their home country), several factors mitigate this concern. First, the instrument is based on the firm-level need for credit, making it unlikely that the need of any single firm would significantly influence aid to a specific region. Second, the aid in our sample is not directly allocated to firms; instead, it is aimed at projects to improve regional development, such as infrastructure projects. Finally, we instrument the number of affiliates between 2007-2019 by considering the parent company's need for credit during the period 1997-2006, using the share of affiliates in 2007. Therefore, it is unlikely that the number of firms at the start of our sample would affect aid over the following years, except through its impact on the future number of affiliates. This instrument isolates exogenous variation in ownership links driven by the historical financial conditions of European and U.S. parent firms and global credit availability, effectively mitigating potential reverse causality from aid flows to firm ownership decisions, and omitted variable bias.

Goldsmith-Pinkham et al. (2020) argue that a Bartik-style instrument based on differential exposure to common shocks can be interpreted as a difference-in-differences (DiD) analysis. In our context, we examine the differential effect of a credit shock on the number of affiliates across regions with a high versus low probability of hosting affiliates from donor countries. For identification, our strategy requires that aid in regions with different probabilities of hosting affiliates is not differentially affected by changes in international credit availability—except through their impact on the number of donor affiliates. As in any DiD framework, we rely on the absence of differential pre-trends across groups. To assess this assumption, Figure 2.5 plots the variation in international credit availability (yellow dashed line) together with the variation in aid commitments for regions with a high

probability of hosting affiliates (blue line), low probability (red line), and no affiliates (green line).[35] As shown in the figure, the trends in affiliates and aid commitments appear broadly parallel across regions with higher and lower probabilities of hosting affiliates.

Figure 2.5: IV parallel trends



Notes: The yellow dashed line illustrates the evolution of international credit availability over time (right y-axis). The blue, red, and green lines depict the evolution of log aid commitments (plus 1) over time (left y-axis) for ADM2 regions with a high probability, low probability, and no probability of hosting affiliates, respectively.

It should be noted that, unlike Sonno (2025), our instrument is aggregated at the donor-region level—i.e., it has a dyadic structure—rather than at the cell level. As a result, the author counts the total number of affiliates within a cell without distinguishing for their country of origin, whereas our measure captures the number of affiliates from a specific donor country within a region. This structure results in lower variability in our instrument compared to Sonno (2025). Specifically, in our dyadic specification, changes in affiliates from one donor do not affect the number of affiliates of other donors, which remains constant. Moreover, our instrument requires that each donor should have a positive share of affiliates across multiple regions to better exploit the variation induced by the shock, while in Sonno (2025) it suffices that a single donor has a positive share. This difference in variability is evident in Table B1, which reports the shock distribution without (column 1) and

[35]The high- and low-probability groups are defined relative to the median probability of hosting affiliates.

with (column 2) residualizing on year fixed effects. While the distributions are broadly similar, the interquartile range—equal to 32—is roughly ten times smaller than in Sonno (2025), indicating much lower shock variability.[36] Therefore, to prevent much of the variability from being absorbed by ADM2 region-donor fixed effects, we relax the dyadic fixed effect the ADM1 region–donor level. While this adjustment introduces an econometric change, it does not affect the economic interpretation. In fact, it is reasonable to assume that a donor country maintains specific time-invariant ties with the entire recipient country (e.g., historical political alliances) or with broader subnational areas such as ADM1 regions (e.g., colonial legacies), rather than with smaller units like ADM2 regions.

Table 2.8 presents the results of the 2SLS estimations using ADM2 data and when relaxing the dyadic fixed effects to the ADM1 region–donor level. As shown, the F-statistic consistently exceeds the conventional threshold of 10, indicating that the instrument is strong. Moreover, the first-stage results are significant at the 1% level across all specifications, suggesting that during periods of tightening credit conditions, parent companies are more likely to close their affiliates. In the second stage, we find that the total number of ownership links is positive and statistically significant in all specifications, and is associated with higher total aid commitments received by a region. More precisely, in our preferred specification (column 2), each additional ownership link corresponds to a 21.8% higher amount of aid. Furthermore, results in columns 3 and 4 indicate that what truly matters is the donor-specific link rather than the overall level of economic activity in the region, as captured by the variable *Other donor firms*, which is negative and close to zero.[37] Finally, Table B3 in the Appendix reports the reduced-form estimates, showing that the instrument is positively associated with aid commitments.

A skeptical reader might be concerned that our measure of international credit availability is endogenous, since aid flows from a given donor country could be directly influenced by credit conditions in that same donor country. In other words, changes in domestic credit availability may affect a donor's capacity to provide aid, thereby violating the exclusion restriction. To address this concern,

[36] Table B1 also reports the effective sample size of the exposure variable computed as the inverse of the Herfindahl-Hirschman index (HHI). As can be seen, the value equal to 260.98 is particularly high.

[37] To better compare these findings with the OLS results, we re-estimate our baseline specification while relaxing the dyadic fixed effects to the ADM1 region-donor level. As shown in Table B2 in the Appendix, the results remain positive and significant, although in our preferred specification they are approximately six times smaller than their IV counterparts (column 2).

Table 2.8: Firm linkages and total aid commitments, IV strategy 2007-2019

	log(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
Total ownership links	0.307***	0.197***	0.274***	0.303***
	(0.055)	(0.048)	(0.052)	(0.051)
Other donor firms			-0.006**	-0.009***
			(0.003)	(0.003)
(log) Population			0.053***	0.065***
			(0.003)	(0.002)
(log) Nightlight			0.022***	-0.004***
			(0.002)	(0.001)
Capital city				2.029***
				(0.156)
Mine				0.010
				(0.016)
Oil/gas				-0.087***
				(0.007)
(log) Area				0.031***
				(0.002)
Port				0.181***
				(0.040)
Road density				0.136***
				(0.022)
Observations	1,423,850	1,423,850	1,403,596	1,403,596
ADM1 x Donor	Yes	Yes	Yes	
ADM2 x Year		Yes		
Donor x Year		Yes	Yes	Yes
Kleibeergen - Paap F stat	54.71	55.09	61.55	41.65
First stage estimates	0.029***	0.026***	0.027***	0.045***
	(0.004)	(0.004)	(0.003)	(0.007)

Notes: The dependent variable is the log of commitments (plus 1) given to ADM2 region r in year t by donor d.*Total ownership links* is the number of ownership links between the region r and the donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM1 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

we modify the shift component of our instrumental variable by applying a leave-one-out (L.O.O.) strategy. Specifically, we multiply the parent firm *m*'s credit dependence, $dep^{m}_{97,06}$, from donor *d* by the measure of international credit availability excluding the contribution of donor *d* itself. In this way, the instrument captures only credit availability shocks that occur outside the donor's country of origin.[38] This adjustment ensures that the variation driving our instrument is not mechanically

[38]It is worth noting that we are still excluding Africa in the computation of international credit availability.

correlated with the donor's own ability to provide aid. At the same time, the logic of the instrument remains valid, as multinational parent firms are assumed to operate globally and thus have access to credit markets beyond their home country. Therefore, it is reasonable to expect that their investment and affiliate decisions can still respond to international credit fluctuations even after excluding domestic credit conditions. Table B4 in the Appendix reports the results obtained using the L.O.O. IV strategy. As shown, both the first- and second-stage estimates are very similar to those in Table 2.8, and the strength of the instrument remains unchanged across all specifications.

2.6.2 Additional Specifications

Our baseline specification measures aid using donor commitments, which capture the amounts pledged rather than the actual disbursements. To verify the robustness of our results, we re-estimate the baseline model using the logarithm of aid disbursements (plus 1) as the dependent variable instead of aid commitments. Table B5 in the Appendix shows that the results remain robust across all specifications and are quantitatively very similar to those obtained using aid commitments. This suggests that project flows—initially driven by ownership links at the commitment stage—are consistent over time when measured in terms of actual disbursements.

We then test whether our baseline results hold when using the hyperbolic sine transformation of the dependent variable instead of the logarithmic one. The advantage of this transformation is that it allows us to retain zero observations without adding one to aid commitments. As shown in Table B6, the results remain statistically significant and very similar to those obtained with the logarithmic specification. To differently deal with the problem of a large number of zeros in the dependent variable, we also decide to test whether the results are robust to the exclusion of the regions that have never received aid over the entire sample period. Table B7 shows that the results are robust across all specifications when we exclude regions that never receive aid.

2.6.3 Sample dependence

As a final robustness check, we re-estimate our model excluding the financial crisis years (2007-2009). While region-year and donor-year fixed effects account for time-specific shocks, the crisis period may contain outlier events in terms of multinational activities and aid dynamics which drive

our results. As can be seen in Table B8, our proxy for economic ties is positive and significant across all specifications. The next section concludes.

2.7 Conclusion

This paper leverages granular data on subnational economic ties between Western aid donor countries and African aid recipient regions to test whether firm ownership ties determine aid flows. Using dyadic donor country–ADM2 recipient region data, we show that aid from 18 European donor countries and the United States is disproportionately allocated to ADM2 regions with stronger commercial ties to the donor, proxied by firm ownership links from Orbis. When controlling for indicators of need and various fixed effects, we find that, on average, an additional ownership link in an ADM2 region corresponds to a 2.7% higher amount of aid. We find similar results when focusing on ADM1 regions, although the coefficients are in absolute terms smaller. Our results are also robust to a series of alternative specifications, including different measures of aid. Focusing on individual donors, we find that France, the United Kingdom, and the United States allocate higher aid commitments to African regions with ownership links to firms from their respective countries. Moreover, we find that aid flows disproportionately to regions with large multinationals and to those operating in the infrastructure sector, those that are more likely to have macroeconomic relevance and political visibility for the donor country.

These findings point to a systematic departure from purely need-based aid allocation and are consistent with recent shifts in how donor governments conceptualize foreign aid. As aid budgets face increasing fiscal and political constraints, development assistance is increasingly embedded within broader geo-economic strategies, where economic presence, strategic influence, and foreign policy objectives intersect. In this context, aid does not operate purely as a humanitarian transfer, but also as a policy instrument that can reinforce existing commercial networks and sustain donor influence abroad.

This raises concerns about the impartiality of aid distribution. Policymakers should focus on enhancing transparency around the strategic objectives embedded in aid allocation and on limiting the extent to which economic interests undermine developmental targeting. Recipient countries may leverage economic ties to attract aid, but should be cautious not to let these ties skew develop-

ment priorities. Lastly, international organizations should monitor aid flows to ensure that support reaches the most vulnerable regions, regardless of their economic connections. An important avenue for future research is to assess the extent to which economic ties shape the effectiveness of aid, focusing on the role of domestic industrial policy priority.

References

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review*, *91*(5), 1369–1401. https://doi.org/10.1257/aer.91.5.1369

Alesina, A., & Dollar, D. (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth*, *5*(1), 33–63. https://doi.org/10.1023/A:1009874203400

Altomonte, C., & Rungi, A. (2013). *Business groups as hierarchies of firms* (Working Paper No. 1554). European Central Bank. Frankfurt am Main. https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1554.pdf

Anaxagorou, C., Efthyvoulou, G., & Sarantides, V. (2020). Electoral motives and the subnational allocation of foreign aid in sub-Saharan Africa. *European Economic Review*, *127*, 103430. https://doi.org/10.1016/j.euroecorev.2020.103430

Antràs, P. (2016). *Global production: Firms, contracts, and trade structure*. Princeton University Press.

Bajgar, M., Berlingieri, G., Calligaris, S., Criscuolo, C., & Timmis, J. (2020). *Coverage and representativeness of Orbis data* (tech. rep. No. 2020/06). OECD Publishing. Paris. https://doi.org/10.1787/c7bdaa03-en

Baldwin, R. (2016). *The great convergence: Information technology and the new globalization*. Harvard University Press.

Bayramoglu, B., Jacques, J.-F., Nedoncelle, C., & Neumann-Noel, L. (2023). International climate aid and trade. *Journal of Environmental Economics and Management*, *117*, 102748. https://doi.org/10.1016/j.jeem.2022.102748

Bluhm, R., Dreher, A., Fuchs, A., Parks, B. C., Strange, A. M., & Tierney, M. J. (2025). Connective financing: Chinese infrastructure projects and the diffusion of economic activity in developing countries. *Journal of Urban Economics*, *145*, 103730.

BMZ. (2024). *Haushaltsentwurf 2025: Entwicklungspolitik im fokus* (tech. rep.). BMZ. Berlin. https://www.bmz.de

Bomprezzi, P., Dreher, A., Fuchs, A., Hailer, T., Kammerlander, A., Kaplan, L. C., Marchesi, S., Masi, T., Robert, C., & Unfried, K. (2024). *Wedded to prosperity? Informal influence and regional favoritism* (Discussion Paper No. 18878). CEPR. CEPR Discussion Paper. http://cepr.org/publications/dp18878

Briggs, R. C. (2017). Does foreign aid target the poorest? *International Organization*, *71*(1), 187–206. https://EconPapers.repec.org/RePEc:cup:intorg:v:71:y:2017:i:01:p:187-206_00

Briggs, R. C. (2018a). Leaving no one behind? A new test of subnational aid targeting. *Journal of International Development*, *30*(5), 904–910. https://doi.org/10.1002/jid.3357

Briggs, R. C. (2018b). Poor targeting: A gridded spatial analysis of the degree to which aid reaches the poor in Africa. *World Development*, *103*, 133–148. https://doi.org/https://doi.org/10.1016/j.worlddev.2017.10.020

Briggs, R. C. (2021). Why does aid not target the poorest? *International Studies Quarterly*, *65*(3), 739–752. https://doi.org/10.1093/isq/sqab035

Bureau van Dijk, P. (2024). Orbis. Retrieved September 29, 2024, from https://login.bvdinfo.com/R0/Orbis

Chauvet, L., & Wagner, L. (2018). Economic diplomacy: Do European donor countries' affiliates benefit from foreign aid? *Unpublished*.

Chiovelli, G., Le Rossignol, E., Michalopoulos, S., & Papaioannou, E. (2025). *Private colonialism in Africa* [Mimeo].

CIESIN. (2018). Gridded population of the world, version 4 (gpwv4): Population count, revision 11. *Center for International Earth Science Information Network, NASA Socioeconomic Data and Applications Center (SEDAC). Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC)*.

Cravino, J., & Levchenko, A. A. (2017). Multinational firms and international business cycle transmission. *The Quarterly Journal of Economics*, *132*(2), 921–962. https://doi.org/https://doi.org/10.1093/qje/qjw043

Cruzatti C., J., Dreher, A., & Matzat, J. (2023). Chinese aid and health at the country and local level. *World Development*, *167*, 106214. https://doi.org/10.1016/j.worlddev.2023.106214

Del Prete, D., & Rungi, A. (2017). Organizing the global value chain: A firm-level test. *Journal of International Economics*, *109*, 16–30. https://doi.org/https://doi.org/10.1016/j.jinteco.2017.08.003

Dietrich, S. (2013). Bypass or engage? Explaining donor delivery tactics in foreign aid allocation. *International Studies Quarterly*, *57*, 698–712. https://doi.org/https://doi.org/10.1111/isqu.12041

Dreher, A., Eichenauer, V. Z., & Gehring, K. (2018). Geopolitics, aid, and growth: the impact of UN Security Council Membership on the effectiveness of aid. *The World Bank Economic Review*, *32*(2), 268–286. https://doi.org/10.1093/wber/lhw037

Dreher, A., Fuchs, A., Hodler, R., Parks, B. C., Raschky, P. A., & Tierney, M. J. (2019). African leaders and the geography of China's foreign assistance. *Journal of Development Economics*, *140*, 44–71. https://doi.org/10.1016/j.jdeveco.2019.04.003

Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. J. (2021). Aid, China, and growth: Evidence from a new global development finance dataset. *American Economic Journal: Economic Policy*, *13*(2), 135–174.

Dreher, A., Klasen, S., Vreeland, J. R., & Werker, E. (2013). The costs of favoritism: Is politically driven aid less effective? [Publisher: The University of Chicago Press]. *Economic Development and Cultural Change*, *62*(1), 157–191. https://doi.org/10.1086/671711

Dreher, A., Lang, V., & Reinsberg, B. (2024). Aid effectiveness and donor motives. *World Development*, *176*, 106501. https://doi.org/10.1016/j.worlddev.2023.106501

Dreher, A., Langlotz, S., & Marchesi, S. (2017). Information transmission and ownership consolidation in aid programs. *Economic Inquiry*, *55*, 1671–1688. https://doi.org/https://doi.org/10.1111/ecin.12450

Dreher, A., & Lohmann, S. (2015). Aid and growth at the regional level. *Oxford Review of Economic Policy*, *31*(3-4), 420–446.

Eni. (2022). Eni's agri-hub. https://www.eni.com/en-IT/actions/global-activities/kenya.html

Farrell, H., & Newman, A. L. (2019). Weaponized interdependence: How global economic networks shape state coercion. *International Security*, *44*(1), 42–79. https://doi.org/10.1162/isec_a_00351

Faye, M., & Niehaus, P. (2012). Political aid cycles. *American Economic Review*, *102*(7), 3516–3530. https://doi.org/10.1257/aer.102.7.3516

FCDO. (2024). *Uk official development assistance (ODA) allocations 2024 to 2025* (tech. rep.). Government of the United Kingdom. https://www.gov.uk/government/publications/uk-oda-budget-allocations-2024-25

Financial Times. (2024). The EU knows aid is not only a moral duty but a strategic necessity. Retrieved June 6, 2025, from https://www.ft.com/content/a729f363-f7f1-4438-b3c1-b1604d7b3847

France 24. (2018). French tycoon Bollore's African assets. https://www.france24.com/en/20180425-french-tycoon-bollores-african-assets

Ganga, P. (2024). Ties that bind: Tied aid and economic growth. *Studies in Comparative International Development*, 1–19.

Gehring, K., Kaplan, L. C., & Wong, M. H. L. (2022). China and the World Bank—how contrasting development approaches affect the stability of African states. *Journal of Development Economics*, *158*, 102902. https://doi.org/10.1016/j.jdeveco.2022.102902

Goldsmith-Pinkham, P., Sorkin, I., & Swift, H. (2020). Bartik instruments: What, when, why, and how. *American Economic Review*, *110*(8), 2586–2624.

Gov. of Sweden. (2024). *Budget bill for 2025: International development cooperation* (tech. rep.). Ministry for Foreign Affairs. Stockholm. https://www.government.se

Henderson, J. V., Storeygard, A., & Weil, D. N. (2012). Measuring economic growth from outer space. *American Economic Review*, *102*(2), 994–1028.

Hoeffler, A., & Sterck, O. (2022). Is Chinese aid different? *World Development*, *156*, 105908.

Isaksson, A.-S., & Kotsadam, A. (2018). Chinese Aid and Local Corruption. *Journal of Public Economics*, *159*, 146–159. https://doi.org/10.1016/j.jpubeco.2018.01.002

Jepma, C. J. (1991). *The tying of aid* [OCLC: 23359461]. Development Centre of the Organisation for Economic Co-operation; Development ; OECD Publications; Information Centre [distributor]. Retrieved September 29, 2024, from http://bvbr.bib-bvb.de:8991/F?func=service&doc_library=BVB01&doc_number=002911510&line_number=0001&func_code=DB_RECORDS&service_type=MEDIA

Kalemli-Özcan, Ş., Laeven, L., & Moreno, D. (2022). Debt overhang, rollover risk, and corporate investment: Evidence from the European crisis. *Journal of the European Economic Association*, *20*(6), 2353–2395. https://doi.org/10.1093/jeea/jvac018

Kalemli-Özcan, Ş., Sørensen, B. E., Villegas-Sanchez, C., Volosovych, V., & Yeşiltaş, S. (2024). How to construct nationally representative firm-level data from the Orbis Global Database: New facts on SMEs and aggregate implications for industry concentration. *American Economic Journal: Macroeconomics*, *16*(2), 353–374.

Kilby, C. (2009). The political economy of conditionality: An mmpirical analysis of World Bank loan disbursements. *Journal of Development Economics*, *89*(1), 51–61. https://doi.org/10.1016/j.jdeveco.2008.06.014

Kilby, C. (2015). Assessing the impact of World Bank preparation on project outcomes. *Journal of Development Economics*, *115*, 111–123. https://doi.org/10.1016/j.jdeveco.2015.02.005

Knack, S., & Smets, L. (2013). Aid Tying and Donor Fragmentation. *World Development*, *44*, 63–76. https://doi.org/10.1016/j.worlddev.2012.09.006

Kuziemko, I., & Werker, E. (2006). How much is a seat on the Security Council worth? Foreign aid and bribery at the United Nations [Publisher: The University of Chicago Press]. *Journal of Political Economy*, *114*(5), 905–930. https://doi.org/10.1086/507155

Le Monde. (2024). How TotalEnergies and France's foreign ministry work hand in hand. https://www.lemonde.fr/en/environment/article/2024/06/04/how-totalenergies-and-france-s-foreign-ministry-work-hand-in-hand_6673776_114.html

LeSage, J., & Pace, R. K. (2009). *Introduction to spatial econometrics*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85045659213&partnerID=40&md5=f36c5e559bdadaa988c0541a6335d735

Li, X., Zhou, Y., Zhao, M., & Zhao, X. (2020). A harmonized global nighttime light dataset 1992–2018. *Scientific data*, *7*(1), 168.

Marchesi, S., Masi, T., & Paul, S. (2025). Aid projects and firm performance. *Economic Development and Cultural Change*, *73*(3), 1251–1295.

Martínez-Zarzoso, I., Nowak-Lehmann D., F., & Rehwald, K. (2017). Is aid for trade effective? A panel quantile regression approach. *Review of Development Economics*, *21*, e175–e203. https://doi.org/10.1111/rode.12322

Maurer, N. (2013). *The empire trap: The rise and fall of U.S. intervention to protect american property overseas, 1893-2013*. Princeton University Press.

Michalopoulos, S., & Papaioannou, E. (2020). Historical legacies and african development. *Journal of Economic Literature*, *58*(1), 53–128. https://doi.org/10.1257/jel.20181447

Morrissey, O. (1993). The mixing of aid and trade policies. *The World Economy*, *16*(1), 69–84.

Nunnenkamp, P., Öhler, H., & Sosa Andrés, M. (2017). Need, merit and politics in multilateral aid allocation: A district-level analysis of World Bank projects in India. *Review of Development Economics*, *21*, 126–156. https://doi.org/10.1111/rode.12259

OECD. (2005). *Guidelines for multinational enterprises*.

OECD. (2025). *Development co-operation report 2025: Strengthening trust in global development finance*. https://doi.org/10.1787/dev-coop-2025-en

O'Sullivan, M., Overland, I., & Sandalow, D. (2017). *The geopolitics of renewable energy* (Faculty Research Working Paper). Belfer Center for Science and International Affairs, Harvard Kennedy School. Cambridge, MA. https://www.belfercenter.org/publication/geopolitics-renewable-energy

Overland, I., Vakulchuk, R., & Scholten, D. (2020). Renewable energy and geopolitics: A review. *Energy Research & Social Science*, *68*, 101601. https://doi.org/10.1016/j.erss.2020.101601

Ribeiro, S. P., Menghinello, S., & De Backer, K. (2010). The OECD ORBIS database: Responding to the need for firm-level micro-data in the OECD.

Rosati, N., Bomprezzi, P., Ferraresi, M., Frigo, A., & Nardo, M. (2020). Common shareholding in Europe [ISBN: 9789276208761 ISSN: 1831-9424]. https://doi.org/10.2760/734264

Rosati, N., Bomprezzi, P., & Martinez Cillero, M. (2024). Critical dimensions in the empirical measurement of common shareholding. *Research in International Business and Finance*, *70*, 102315. https://doi.org/10.1016/j.ribaf.2024.102315

Silva, S. J., & Nelson, D. (2012). Does aid cause trade? Evidence from an asymmetric gravity model. *The World Economy*, *35*(5), 545–577. https://doi.org/10.1111/j.1467-9701.2011.01431.x

Sonno, T. (2025). Globalization and conflicts: The good, the bad, and the ugly of corporations in africa. *The Economic Journal*, *135*(668), 1108–1140.

The Economist. (2025a). Aid cannot make poor countries rich. Retrieved June 6, 2025, from https://www.economist.com/finance-and-economics/2025/03/06/aid-cannot-make-poor-countries-rich

The Economist. (2025b). The demise of foreign aid offers an opportunity. Retrieved June 7, 2025, from https://www.economist.com/leaders/2025/03/06/the-demise-of-foreign-aid-offers-an-opportunity

The Economist. (2025c). How the Trump administration learned to love foreign aid. Retrieved October 2, 2025, from https://www.economist.com/finance-and-economics/2025/10/02/how-the-trump-administration-learned-to-love-foreign-aid

Turk-Ariss, R., Bomprezzi, P., & Marchesi, S. (2022). Do IMF programs stimulate private sector investment? *IMF Working Papers*, *2022*(157), 1. https://doi.org/10.5089/9798400216800.001

U.S. Department of State. (2025). Department press briefing – July 2, 2025 [Statement by Secretary Marco Rubio announcing the closure of USAID and redirection of U.S. foreign assistance].

Wagner, D. (2003). Aid and trade—an empirical study. *Journal of the Japanese and International Economies*, *17*(2), 153–173. https://doi.org/10.1016/S0889-1583(03)00010-8

Appendices

Appendix A: Descriptives

Appendix B: Robustness tables

Appendix A: Descriptives

Table A1: Ownership links in African countries, 2007-2019

Country	Links	Country	Links
Algeria	2,918	Madagascar	595
Angola	1,905	Malawi	432
Benin	366	Mali	453
Botswana	848	Mauritania	193
Burkina Faso	288	Morocco	9,173
Burundi	86	Mozambique	1,381
Cameroon	822	Namibia	814
Central African Rep.	68	Niger	163
Chad	138	Nigeria	3,892
Republic of Congo	477	Rwanda	246
Côte d'Ivoire	1,419	Sao Tome And Principe	64
Democratic Rep. of Congo	713	Senegal	1,177
Djibouti	131	South Africa	27,724
Egypt	5,501	South Sudan	26
Equatorial Guinea	220	Swaziland	229
Eritrea	23	Tanzania	940
Ethiopia	169	Togo	341
Gabon	625	Tunisia	3,517
Gambia	73	Uganda	118
Ghana	1,289	Zambia	285
Guinea	344	Zimbabwe	885
Guinea-Bissau	59	Kenya	2,583
Liberia	809		

Notes: The table shows the number of ownership links from European countries and U.S. for each African country in the sample. We do not have ownership links in Sierra Leone, Somalia, and Sudan.

Table A2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Commitments (in million)	1,542,505	0.03	1.59	0	807.02
Disbursements (in million)	1,542,445	0.02	0.74	0	352
Total ownership links	1,542,515	0.05	1.74	0	625
Other donor firms	1,542,515	0.87	15.65	0	1,414
Population (in million)	1,522,641	0.18	0.32	0	6.13
Nightlight intensity	1,522,641	8.90	15.13	0	63
Capital city	1,522,641	0.01	0.09	0	1
Mine	1,522,641	0.06	0.23	0	1
Oil/gas	1,522,641	0.11	0.31	0	1
Area	1,522,641	4,396.44	13,413.69	0	331,866.87
Port	1,542,515	0.02	0.15	0	1
Road density	1,522,641	0.19	0.34	0	8.64

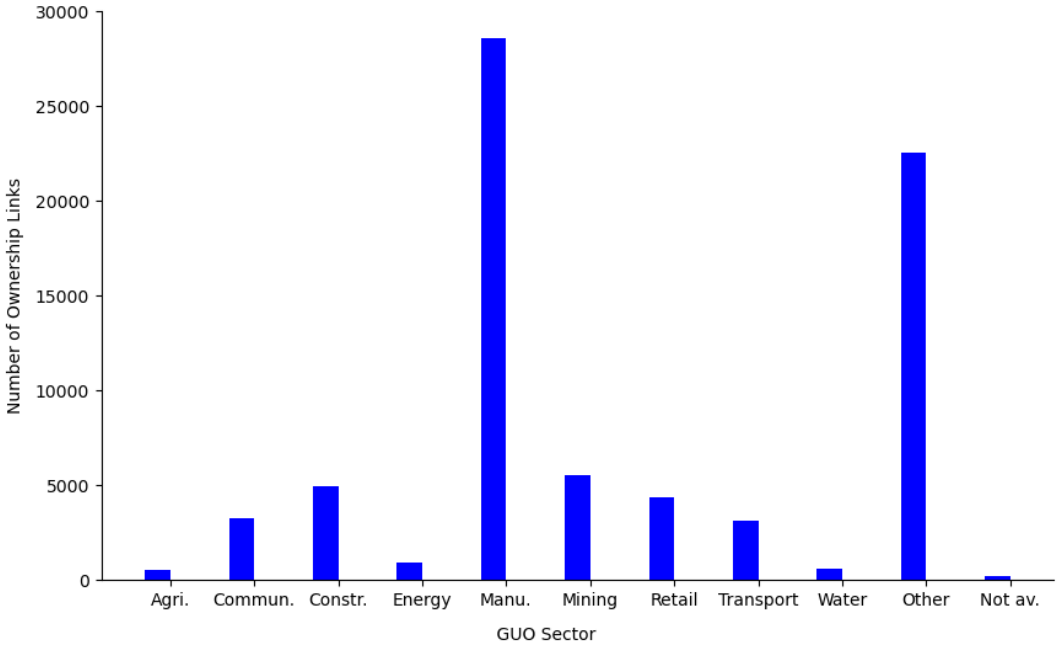
Notes: It reports the summary statistics of the variables used in the analysis. All monetary variables are expressed in constant US$.

Table A3: Definition and sources

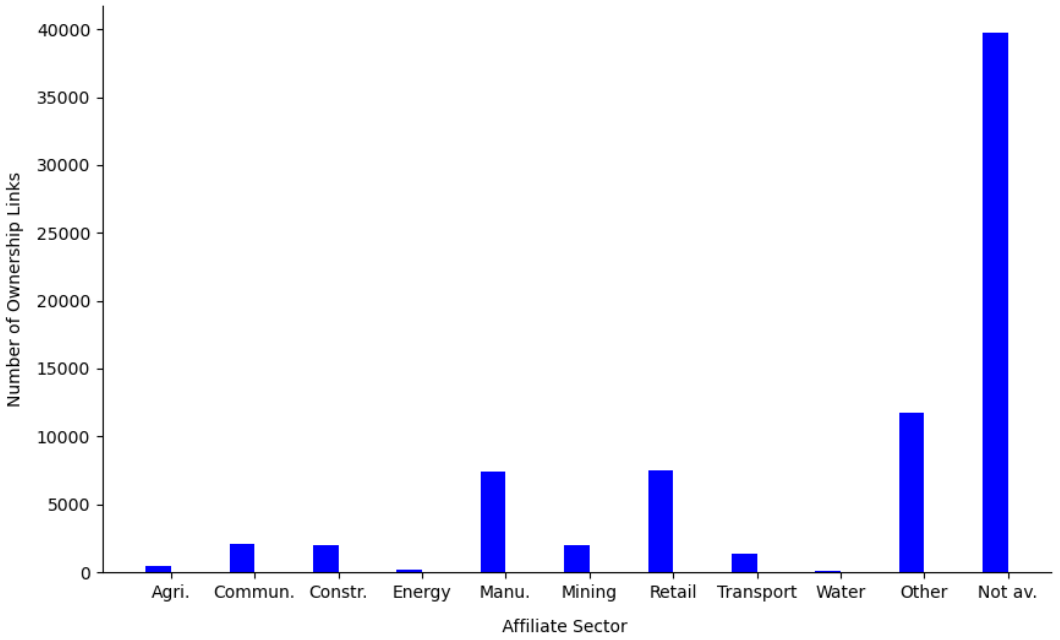
Variable	Description	Source	Unit
Dependent variables			
Commitments	Aid commitments from a given Western donor country to a specific African region	GODAD	Constant 2014 US$
Disbursements	Aid disbursements from a given Western donor country to a specific African region	GODAD	Constant 2014 US $
Independent variables of interest			
Total ownership links	Number of African affiliates owned by firms from a given donor country and located in a specific African region. A firm is classified as an affiliate if a multinational holds at least 50.01% of its shares	Own elaboration from Orbis Historical	Unit
Other donor firms	Number of African affiliates owned by firms from other Western donor countries and located in a specific African region. A firm is classified as an affiliate if a multinational holds at least 50.01% of its shares	Own elaboration from Orbis Historical	Unit
Bilateral experience	Cumulative number of years in which a donor country has provided aid commitments to a given African region	Own elaboration from GODAD	Unit
Private links	Number of African affiliates owned by private firms from a given donor country and located in a specific African region. A firm is classified as an affiliate if a multinational holds at least 50.01% of its shares	Own elaboration from Orbis Historical	Unit
State-owned links	Number of African affiliates owned by state-owned firms from a given donor country and located in a specific African region. A firm is classified as an affiliate if a multinational holds at least 50.01% of its shares	Own elaboration from Orbis Historical	Unit
Control variables			
Population	Total population of a specific African region	CIESIN, 2018	Unit
Nightlight	Average nightlight emissions of a given African region	Li et al., 2020	Unit
Capital city	Dummy = 1 if the city is the capital of the region	Bomprezzi et al., 2024	Binary
Mine	Dummy = 1 if the region contains a mine site	Bomprezzi et al., 2024	Binary
Oil/gas	Dummy = 1 if the region contains an oil or gas site	Bomprezzi et al., 2024	Binary
Area	Region total square kilometers	Bomprezzi et al., 2024	km^2
Port	Dummy = 1 if the region contains a port	Bomprezzi et al., 2024	Binary
Road density	Total kilometers of road per square kilometer	Bomprezzi et al., 2024	km/km^2
Instrument components			
Cre	Measure of international credit availability, computed as the sum of domestic credit to the private sector across all non-African countries and divided by world GDP	Own elaboration from WDI data	%
Dep	Average liability-to-asset ratio (excluding equity) of a parent firm	Own elaboration from Orbis Financial	%
W	Number of affiliates owned by a given parent company in an African region, divided by the total number of Western-owned affiliates in the same region	Own elaboration from Orbis Historical	%

Figure A1: Total ownership links by sector, 2007-2019

Panel A: GUO's Sector

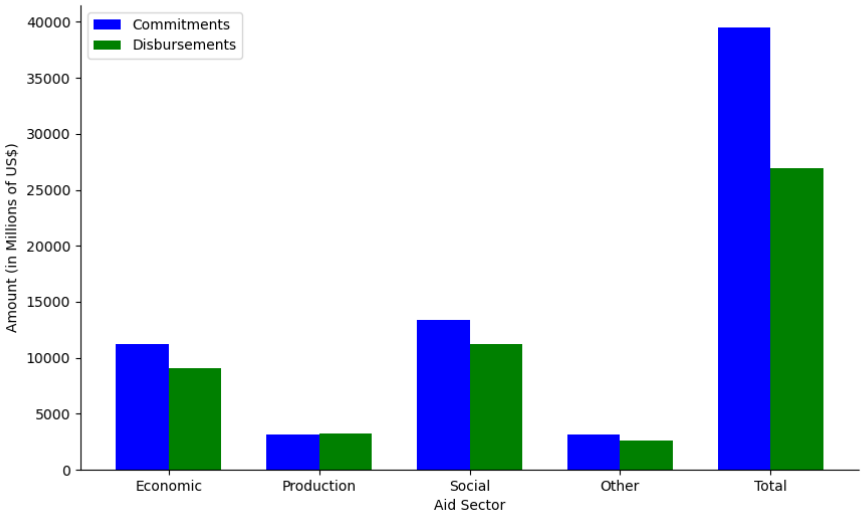


Panel B: Affiliate's Sector



Notes: Panel A shows the total ownership links between European and U.S. owners and African affiliates, distinguished by the owners' sector. Panel B distinguishes the links by the affiliates' sector. Sectors are defined according to the NACE sections: agriculture refers to section A; communications to sections H and J; construction to section F; energy to sections D and E; manufacturing to section C; mining to section B; retail to sections G and I; and other sectors to sections K–V.

Figure A2: Total aid commitments and disbursements by aid sector



Notes: The figure shows the total amount of aid commitments (in blue) and disbursements (in green) by aid sector over the sample period 2007-2019.

Appendix B: Robustness tables

Table B1: Distribution of shock variable

Shock Variable		
Mean	79.19	0.00
Standard deviation	87.68	87.64
Interquartile range	33.38	32.11
Specification		
Residualizing on year FE	No	Yes
Exposure variable		
Effective sample size: 1/HHI of weights (Year 2007)		260.98

Notes: In the panel above, we show the mean, standard deviation, and interquartile range of the distribution of the shock variable, without (column 1) and with (column 2) residualizing on year-fixed effects. The bottom panel presents the inverse of the HHI of the shock-level average exposure.

Table B2: Firm linkages and total aid with different fixed effects

	log(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
Total ownership links	0.054***	0.032***	0.037**	0.049**
	(0.018)	(0.012)	(0.015)	(0.020)
Other donor firms			0.005***	0.003***
			(0.001)	(0.001)
(log) Population			0.054***	0.066***
			(0.003)	(0.002)
(log) Nightlight			0.022***	-0.003**
			(0.002)	(0.001)
Capital city				2.094***
				(0.124)
Mine				0.020
				(0.015)
Oil/gas				-0.089***
				(0.007)
(log) Area				0.031***
				(0.002)
Port				0.198***
				(0.029)
Road density				0.139***
				(0.022)
Observations	1,423,850	1,423,850	1,403,596	1,403,596
R-squared	0.192	0.281	0.198	0.053
ADM1 x Donor	Yes	Yes	Yes	
ADM2 x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the log of commitments (plus 1) given to ADM2 region r in year t by donor d. *Total ownership links* is the number of ownership links between the region r and the donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM1 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Table B3: Firm linkages and total aid, IV reduced form

	log(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
$z_{r,c,d,t-1}$	0.009***	0.005***	0.007***	0.014***
	(0.001)	(0.001)	(0.001)	(0.002)
Other donor firms			0.006***	0.005***
			(0.001)	(0.001)
(log) Population			0.054***	0.066***
			(0.003)	(0.002)
(log) Nightlight			0.022***	-0.004***
			(0.002)	(0.001)
Capital city				2.075***
				(0.124)
Mine				0.018
				(0.015)
Oil/gas				-0.089***
				(0.007)
(log) Area				0.031***
				(0.002)
Port				0.193***
				(0.029)
Road density				0.139***
				(0.023)
Observations	1,423,850	1,423,850	1,403,596	1,403,596
R-squared	0.190	0.280	0.198	0.052
ADM1 x Donor	Yes	Yes	Yes	
ADM2 x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the log of commitments (plus 1) given to ADM2 region r in year t by donor d. $z_{r,c,d,t-1}$ is the instrument described in Section 2.6 for ADM2 region r of country c and the donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM1 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Table B4: Firm linkages and total aid commitments, L.O.O. IV strategy

	log(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
Total ownership links	0.309***	0.197***	0.275***	0.307***
	(0.056)	(0.049)	(0.052)	(0.052)
Other donor firms			-0.006**	-0.009***
			(0.003)	(0.003)
(log) Population			0.053***	0.065***
			(0.003)	(0.002)
(log) Nightlight			0.022***	-0.004***
			(0.002)	(0.001)
Capital city				2.027***
				(0.157)
Mine				0.010
				(0.016)
Oil/gas				-0.087***
				(0.007)
(log) Area				0.031***
				(0.002)
Port				0.181***
				(0.040)
Road density				0.135***
				(0.022)
Observations	1,423,850	1,423,850	1,403,596	1,403,596
R-squared	-0.067	-0.025	-0.047	-0.035
ADM1 x Donor	Yes	Yes	Yes	
ADM2 x Year		Yes		
Donor x Year		Yes	Yes	Yes
Kleibeergen - Paap F stat	54.20	54.09	60.73	
First stage estimates	0.029***	0.027***	0.027***	0.046***
	(0.004)	(0.004)	(0.003)	(0.007)

Notes: The dependent variable is the log of commitments (plus 1) given to ADM2 region r in year t by donor d. *Total ownership links* is the number of ownership links between the region r and the donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM1 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Table B5: Firm linkages and total aid disbursements, 2007-2019

	log(Disbursements)			
	(1)	(2)	(3)	(4)
	ADM2	ADM2	ADM2	ADM2
Total ownership links	0.026***	0.022**	0.023***	0.057**
	(0.009)	(0.010)	(0.008)	(0.024)
Other donor firms			0.001	0.003***
			(0.001)	(0.001)
(log) Population			0.039*	0.089***
			(0.023)	(0.003)
(log) Nightlight			-0.001	-0.001
			(0.002)	(0.002)
Capital city				2.443***
				(0.142)
Mine				0.024
				(0.018)
Oil/gas				-0.122***
				(0.009)
(log) Area				0.043***
				(0.003)
Port				0.240***
				(0.035)
Road density				0.170***
				(0.026)
Observations	1,423,800	1,423,800	1,403,548	1,403,548
Avg. aid disb.	18,143	18,143	17,737	17,737
R-squared	0.490	0.523	0.495	0.063
Region x Donor	Yes	Yes	Yes	
Region x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the logarithm of aid disbursements (plus 1) given to ADM2 region r of country c in year t by donor d. *Total ownership links* is the number of ownership links that the region r of country c has with donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM2 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Table B6: Firm linkages and total aid commitments, hyperbolic sine transformation

	asinh(Commitments)			
	(1) ADM2	(2) ADM2	(3) ADM2	(4) ADM2
Total ownership links	0.031***	0.028***	0.029***	0.051**
	(0.008)	(0.008)	(0.008)	(0.021)
Other donor firms			0.001	0.003***
			(0.001)	(0.001)
(log) Population			0.023	0.070***
			(0.020)	(0.002)
(log) Nightlight			-0.003*	-0.003**
			(0.001)	(0.001)
Capital city				2.208***
				(0.131)
Mine				0.022
				(0.015)
Oil/gas				-0.095***
				(0.007)
(log) Area				0.033***
				(0.003)
Port				0.210***
				(0.031)
Road density				0.147***
				(0.024)
Observations	1,423,860	1,423,860	1,403,606	1,403,606
R-squared	0.400	0.437	0.404	0.053
Region x Donor	Yes	Yes	Yes	
Region x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the hyperbolic sine of aid commitments given to ADM2 region r of country c in year t by donor d. *Total ownership links* is the number of ownership links that the region r of country c has with country d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM2 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Table B7: Firm linkages and total aid commitments, excluding regions without aid

	log(Commitments)			
	(1)	(2)	(3)	(4)
	ADM2	ADM2	ADM2	ADM2
Total ownership links	0.031***	0.028***	0.029***	0.031**
	(0.009)	(0.010)	(0.007)	(0.013)
Other donor firms			0.000	0.001
			(0.002)	(0.001)
(log) Population			0.121	0.271***
			(0.261)	(0.021)
(log) Nightlight			-0.038**	-0.024*
			(0.017)	(0.013)
Capital city				2.688***
				(0.193)
Mine				-0.079
				(0.090)
Oil/gas				-0.085
				(0.109)
(log) Area				-0.015
				(0.019)
Port				0.469***
				(0.129)
Road density				0.316***
				(0.076)
Observations	111,185	99,929	107,282	107,282
Avg. aid comm.	337,910	358,130	340,494	340,494
R-squared	0.256	0.447	0.281	0.058
Region x Donor	Yes	Yes	Yes	
Region x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the logarithm of aid commitments (plus 1) given to ADM2 region r of country c in year t by donor d. *Total ownership links* is the number of ownership links that the region r of country c has with country d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM2 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Table B8: Firm linkages and total aid commitments, 2010-2019

	log(Commitments)			
	(1)	(2)	(3)	(4)
	ADM2	ADM2	ADM2	ADM2
Total ownership links	0.021***	0.020***	0.020***	0.050**
	(0.005)	(0.006)	(0.005)	(0.020)
Other donor firms			0.001	0.002***
			(0.001)	(0.001)
(log) Population			-0.002	0.068***
			(0.023)	(0.002)
(log) Nightlight			-0.003*	-0.004***
			(0.001)	(0.001)
Capital city				2.147***
				(0.129)
Mine				0.017
				(0.015)
Oil/gas				-0.092***
				(0.007)
(log) Area				0.032***
				(0.002)
Port				0.195***
				(0.029)
Road density				0.135***
				(0.023)
Observations	1,186,540	1,186,540	1,171,302	1,171,302
Avg. aid comm.	28,329	28,329	27,921	27,921
Region x Donor	Yes	Yes	Yes	
Region x Year		Yes		
Donor x Year		Yes	Yes	Yes

Notes: The dependent variable is the logarithm of aid commitments (plus 1) given to ADM2 region r of country c in year t by donor d. *Total ownership links* is the number of ownership links that the region r of country c has with donor d in year $t-1$, while *Other donor links* is the total number of firms of other donors located in the region r in year $t-1$. Columns 1-3 include ADM2 region-donor dummies, columns 2-4 also include donor-year dummies, columns 2 adds ADM2 region-year dummies, and column 4 includes controls as specified in Equation 2.1 in year $t-1$. Standard errors (in parentheses) are clustered at the ADM2 region-donor level. *** p<0.01, ** p<0.05, * p<0.1

Chapter 3

The Role of Chinese Panda Ambassadors in International Trade

Mattia Longhi*, Caterina Morelli*

3.1 Introduction

Tourists at the Berlin Zoo may encounter Jiao Qing and Meng Meng, two giant pandas that arrived from China in June 2017, and their two offspring. At the time of their arrival, the German Chancellor Angela Merkel introduced the new black-and-white residents as "two very pleasant diplomats" (Financial Times, 2017). Seven years later, two giant pandas were welcomed to the San Diego Zoo by California Governor Gavin Newsom and the Chinese ambassador to the United States, who declared that the pandas were sending a clear and important message as the two countries celebrated the 45^{th} anniversary of their diplomatic ties (Reuters, 2024). The Chinese practice of sending giant pandas to other nations is known as panda diplomacy and is part of a broader form of soft power named animal diplomacy, implemented also by other countries around the world.[1] This practice, which consists in using live animals as diplomatic tools, has been used even in the ancient world to either signal subordination to other nations, or as a goodwill, or as a way to start diplomatic relations (Leira & Neumann, 2017), and has recently been recognized as a form of soft power in public diplomacy (Hartig, 2013).

*University of Milan-Bicocca.

[1]For example, New Zealand is famous for its kiwi diplomacy, while Australia is famous for its koala and platypus diplomacy, and India for its elephant diplomacy.

In a world marked by rising geopolitical tensions between major powers, such as the ongoing trade war between the United States and China and renewed frictions between Europe and Russia, countries adjust their alliances, shaping the patterns of international flows (Gopinath et al., 2025). This process is further reinforced by the rise of friendshoring (Javorcik et al., 2024) which reflects how governments are increasingly aligning trade with partners whose political and economic priorities are closely aligned, as a response to ongoing geopolitical tensions. In this context, animal diplomacy may influence diplomatic relations and ease frictions between countries. However, little is known about whether it translates into measurable economic outcomes. This paper aims to fill this gap in the literature by focusing on the effect of Chinese panda diplomacy on international trade.

The Chinese panda diplomacy began as a gesture of friendship towards other countries, as giant pandas live exclusively in a few Chinese provinces (O'Brien et al., 1994), giving China a unique monopoly over them. For decades, China gifted pandas to other countries as symbols of goodwill. However, after the species was declared endangered in the 1980s, China revised its approach. Beginning in the early 1990s, the country began leasing them to other nations for a long period to safeguard the species from extinction, while retaining control over their population and ensuring adherence to conservation standards.[2] Under these agreements, hosting countries pay substantial fees to lease a giant panda, and their zoos invest significant resources to provide a healthy environment and encourage reproduction, through assisted natural mating techniques and artificial insemination. Importantly, newborn cubs remain the property of China and are returned once they mature enough to live independently (Buckinghamn et al., 2013).

Beyond its symbolic value, panda diplomacy is often interpreted as an indicator of political goodwill and strengthened diplomatic relations. Since international trade often follows national diplomatic interests (Pollins, 1989), changes in bilateral trade patterns can offer an informative measure to assess whether panda diplomacy contributes to improved political ties and economic outcomes. Although the arrival of giant pandas in partner countries occasionally aligns with the conclusion of trade agreements or shifts in political relations with China—raising the possibility of endogeneity in recipient selection—the birth of a panda cub is independent of politics and negotiations. Panda births in recipient countries are highly celebrated events, attracting significant attention from the media, the public, and politicians alike. They become a source of pride and joy not only for the host country but also for China, highlighting the strong diplomatic and cultural ties between the

[2]It is worth noting that during the 1980s, China started to lease pandas for a short period of time and on market basis. However, it is at the beginning of the 1990s that the country switched to long-term loans with scientific purposes.

two nations. For instance, in 2013, when a panda cub was born at the Smithsonian's National Zoo, Cui Tiankai, China's then-ambassador to the United States, remarked that there were actually two Chinese ambassadors in Washington: him and the panda cub at the National Zoo (The Washington Post, 2023). The significance China attaches to these events is further underscored by the subsequent high-level greetings and congratulatory messages—often exchanged between Chinese leaders and the host country's head of state or government—and by the 100-day naming ceremony, which typically brings together Chinese diplomats and local officials to reinforce diplomatic engagement.

Hence, this paper investigates whether panda diplomacy contributes to strengthening diplomatic and economic relations between China and other countries. We focus on panda cub births as exogenous shocks in the implementation of this policy and use exports to China as a proxy for changes in bilateral relations and as an economic outcome. Specifically, given that China is an autocratic state that adjusts its trade patterns according to political preferences (Fuchs & Klann, 2013), we expect that a country's exports to China increase following the birth of a new panda cub. In this view, the increase in trade reflects China's political decision to favor countries with which it wishes to strengthen ties—something that becomes particularly visible through the diplomatic interactions that accompany panda births, providing additional opportunities for bilateral engagement. At the same time, panda diplomacy also operates as a form of cultural diplomacy, fostering public interest in Chinese culture within recipient countries. Therefore, we expect that it may also influence imports from China, reflecting its broader role as an instrument of cultural and diplomatic soft power.

To that end, we construct the *Panda Diplomacy Dataset*, which tracks all movements of giant pandas from China to other countries identified as part of this policy. Using this dataset, we estimate an augmented gravity model of international trade based on UN Comtrade data to examine whether a positive political shock—proxied by the birth of a panda cub in a recipient country—affects country's exports to and imports from China. We find that countries hosting giant pandas experience a significant increase in exports to China in the year a cub is born. This result is driven by the fact that China strategically adjusts its trade patterns according to political preferences, rewarding countries toward which it wishes to signal goodwill. In fact, we find that the effect peaks three to four months after the birth, coinciding with the 100-day naming ceremony, which marks the symbolic peak of the improved diplomatic relations. However, the increase is short-lived, fading after about seven months. Consistently with this mechanism, the results are detected only in the group of less politically aligned countries—those for which positive shifts in China's political preferences are more likely to occur. We formally test this implication by exploiting cross-country differences in

political alignment with China, measured by ideal point distance based on voting similarity in the United Nations General Assembly (UNGA) (Bailey et al., 2017). Specifically, we show that exports response to a panda cub's birth emerges only among countries that are ex ante less aligned with China, while no effect is observed for politically aligned partners, for whom diplomatic relations are already stable. The transitory nature of the shock suggests that the temporary improvement in relations soon reverts to the usual, more distant diplomatic stance. In line with this interpretation, the effect is also driven by homogeneous and reference-priced goods, which typically have shorter production cycles than differentiated goods, which are not significantly affected. In contrast, we do not find any significant impact on imports from China. All results remain robust to many alternative specifications, identification tests, and sample dependence checks.

This paper primarily contributes to the emerging literature on geoeconomics. As highlighted in the recent survey by Mohr and Trebesch (2025), this growing body of research examines the relationship between great-power rivalry and economic outcomes. Within this field, we contribute to two major strands of literature that explore the political determinants of international trade and China's international and geopolitical role.

Our first contribution relates to the literature on the political determinants of trade. As highlighted by Gopinath et al. (2025), trade tends to be fragmented along geopolitical lines, reflecting the growing influence of political relations on economic exchanges. Consistent with this view, prior studies show that an increase in a country's diplomatic service (Rose, 2007; Volpe Martincus et al., 2010), state and official visits (Fan & Lu, 2021; Nitsch, 2007), or positive bilateral opinion (Disdier & Mayer, 2007; Guiso et al., 2009; Rose, 2019) tend to increase international trade flows between countries. A similar effect is detected when focusing on the role of military alliances (Jackson & Shepotylo, 2024; Li et al., 2024), and on a more general political influence (Berger et al., 2013). At the same time, researchers highlight that divergent political views (Fuchs & Klann, 2013; Michaels & Zhi, 2010), consumers boycott (Heilmann, 2016; Pandya & Venkatesan, 2016), and sanctions (Afesorgbor, 2019; Gutmann et al., 2023) reduce bilateral trade.[3] However, political shocks do not affect firms in the same way. Scholars suggest that trade adjustments vary depending on firm characteristics, with state-owned enterprises often reacting more strongly (Davis et al., 2019; Lin et al., 2019). Existing studies also show that regime type influences the overall level of trade, as democratic countries tend to be more open to international trade than autocracies (Mansfield et al.,

[3]Using granular data on China, Du et al. (2017) shows that the effects of political shocks on trade are short-lived.

2000; Morrow et al., 1998).[4] As an autocratic country, many papers have focused on the relation between politics and trade in China (Che et al., 2015; Davis et al., 2019; Du et al., 2017; Fuchs & Klann, 2013; Lin et al., 2019), however, to the best of our knowledge, we are the first to estimate panda diplomacy's effects on international trade. Indeed, up to now, only the Financial Times (2017) has descriptively shown that the China's biggest trade partners seem to get the most giant pandas. The paper closest to ours is that of Fuchs and Klann (2013), which investigates the consequences of countries officially receiving the Dalai Lama on their exports to China. Since China treats Tibet as an internal affair, hosting the Dalai Lama is seen as interference in domestic politics. Consequently, the authors find a negative "Dalai Lama effect" on exports, whereas we show that contributing to panda conservation enhances trade relations with China by fostering diplomatic goodwill.

Our second contribution relates to the literature on China's international role. Since the early 2000s, China has sought to expand its global presence—first through the "Going Global Strategy," aimed at promoting overseas investments (Dreher et al., 2022), and later through the "Belt and Road Initiative," which has led to a sharp increase in overseas lending. Building on these initiatives, by 2017 China had become the world's largest official creditor (Horn et al., 2021). Despite the lack of transparency in its lending activities and the creative design of its loan contracts (Gelpern et al., 2023), scholars show that political leaders have incentives to follow China's lead in global capital flows (Broz et al., 2020), thereby unsettling U.S. influence in developing countries exerted through the World Bank (Qian et al., 2023).[5] Yet, when it comes to the allocation of development aid, China does not diverge significantly from Western donors, targeting both recipient need and donor geopolitical interest (Dreher et al., 2018). However, at the subnational level, Chinese aid has been associated with increased corruption and favoritism (Dreher et al., 2019; Isaksson & Kotsadam, 2018).[6] Finally, scholars identify state-owned foreign direct investment (FDI) as another key instrument in advancing China's foreign policy agenda (Stone et al., 2022). We contribute to this literature by showing how panda diplomacy can be leveraged as a strategic tool of Chinese foreign policy, particularly targeting less politically aligned economies.

Finally, while previous quantitative economic studies on animal diplomacy have focused only on tourism, our work is among the first to explore its broader economic implications—specifically, its

[4] Aidt and Gassebner (2010) also show that autocracies typically import less.

[5] China is also challenging IMF's leadership through the provision of swap lines (Broz et al., 2020).

[6] In terms of aid effectiveness, Chinese aid is associated with higher local mortality rates (Cruzatti et al., 2023), although it seems to improve economic performance (Dreher et al., 2021).

impact on international trade. So far the literature mainly consists of descriptive works and political standpoints, while its economic dimension is almost neglected. For example, previous works highlight how animals represent a special type of diplomatic gift and emphasize the need to seriously consider them in rethinking the diplomatic process (Leira & Neumann, 2017), as well as the key elements required for successful animal diplomacy (Hartig, 2013). In the specific case of China, authors describe how giant pandas have been used to promote Chinese national image and diplomacy, and the specific features of this policy (Buckinghamn et al., 2013; Hartig, 2013; Schaller, 1994; Songster, 2018). The political aspect of the panda diplomacy has also garnered the attention of many international media (CNN, 2024; Financial Times, 2017; The Economist, 2019; The Washington Post, 2014), which emphasize the key role of pandas in China's public diplomacy. In relation to panda diplomacy and economics, using a gravity model of tourism, Okafor et al. (2021) shows that the panda diplomacy promotes Chinese outbound tourism flows in countries hosting a giant panda. In contrast, Liu et al. (2024) suggests that inbound tourism to China significantly decreased from country with panda diplomacy with respect to those without such diplomatic relations. Apart for the descriptive work discussed by the Financial Times (2017), which relates pandas diplomacy and trade, no scholarly work has estimated the effects of this form of soft power on trade. We add to this literature by showing that the panda diplomacy seems to increase countries' export to China when a new cub born in one of its zoos, highlighting that such an event can be interpreted as a positive political shock between the two countries. Furthermore, we are the first to exploit panda births as an exogenous shock to the practice of panda diplomacy with respect to international relations.

The remainder of the paper is organized as follows. Section 3.2 provides more details on the panda diplomacy. Section 3.3 describes the data and Section 3.4 explains the empirical strategy. Section 3.5 presents the main results, Section 3.6 explains the mechanism driving the effects, and Section 3.7 contains some robustness checks. The final Section 3.8 concludes.

3.2 Institutional framework

3.2.1 The history of animal diplomacy around the world

The animal diplomacy refers to the practice of using live native fauna for diplomatic purposes (Cushing & Markwell, 2009), most commonly gifting them to other nations. According to Leira and Neumann (2017), this practice dates back to the ancient world, when Nubia frequently sent

giraffes as tributes to Egypt. Before the Common Era, other examples included horses, cattle, and sheep gifted to the Assyrian Empire, as well as camels along the Silk Road. While these offerings often served as tributes, they occasionally had the goal to circumvent trade taxes, or even establish trade relations between nations. Over time, the purpose of such animal gifts shifted. As animals for food and transport became more readily available, the focus shifted to exotic creatures, which began to symbolize the power and prestige of the leaders who presented them. Examples of such exotic gifts include the giraffe received by Frederick II from the Sultan of Egypt (1215), the elephant gifted to Pope Leo X by the Portuguese King (1514), and the giraffe gifted to France by the Pasha of Egypt between 1826 and 1827. In the last example, the giraffe was viewed as a diplomatic ambassador between the two countries, aimed at reassuring the French regarding Egyptian military intentions.

Today, examples of this practice can be found in Australia, with koala (Aranceta-Reboredo, 2022) and platypus (Cushing & Markwell, 2009), in China, with giant pandas, in India, with elephants (Menon, 2019), in New Zealand, with kiwi (The New York Times, 2023), and in few other countries. However, Chinese panda diplomacy represents the most interesting case, which can be explained by the interaction of giant panda's unique characteristics and how China conducts it.

3.2.2 The uniqueness of Chinese panda diplomacy

The Chinese panda diplomacy has long history, apparently dating back to the Tang Dynasty (618-907 A.D.), when Empress Wu Zetian sent two bears—which were believed to be pandas—to Japan (BBC, 2024).[7] Nowadays, panda diplomacy is still being practiced, and in the last century we can observe three periods that characterize its evolution, according to the way in which it is conducted: pandas as state gifts (1941-1983); pandas as short-term loan (1984-1993); and pandas as long-term loan (1994-present). These phases reflect both changes in China's foreign policy priorities and shifting international norms regarding wildlife conservation.

The first records of the modern era dating back to 1941 marked the beginning of "pandas as state gifts," when Madame Chiang, wife of the Generalissimo Chiang Kai-shek, sent two giant pandas to the U.S. to express gratitude for their aid during the Japanese siege of China.[8] However, it is during the era of Mao Zedong as President of the Chinese Communist Party that the use of pandas as

[7] However, according to Songster (2018) it could be a myth.

[8] A few pandas were present in the United Kingdom and the United States as early as 1938, but these animals were acquired independently rather than through panda diplomacy.

instruments of diplomacy became more prominent. Between 1946 and 1983, giant pandas were sent to France, Germany, Japan, Mexico, North Korea, Spain, the Soviet Union, the United Kingdom, and the United States.

A key change in the practice of panda diplomacy occurred in 1984 (Buckinghamn et al., 2013). Following Deng Xiaoping's rise to power, China changed its approach by shifting from gifting pandas to leasing them. The leasing contracts were typically short-term, required a monthly fee of $50,000 per month per panda, and were signed by recipient countries primarily to obtain pandas for exhibition.[9] For that, the aim of panda diplomacy shifted from focusing on international relations to the market, since from that date many zoos around the world began hosting pandas for short-term stays (Buckinghamn et al., 2013).[10] However, according to the same author, this conduct was met with criticism, as the Convention on International Trade in Endangered Species (CITES) implies that giant pandas may only be traded for scientific purposes or to promote the propagation or survival of the species.

In response to these concerns, at the beginning of the 1990s, Chinese authorities revised the policy, establishing long-term loans to support breeding, with the fees used to finance a giant panda management plan.[11] The first long-term contract was negotiated by Japan in May 1993, and the giant pandas arrived in September 1994 (O'Brien et al., 1994). Since that date, no other changes occurred in practicing panda diplomacy, with 77 giant pandas which were sent all over the world up to 2024.[12] It is worth noting that the goal of these changes is to encourage pandas conservation, still maintaining their diplomatic meaning. Indeed, it is notable that the leasing contracts are signed by the highest government level, they imply a fine of $500,000 if a panda dies because of a human error, and cub born in zoos outside China belongs to China and must be returned to its home country within a few years of its birth, once it is old enough to be separated from its mother (Buckinghamn et al., 2013).[13]

Because of these characteristics, focusing our analysis exclusively on the third phase of panda diplo-

[9] The first example of this renewed practice occurred in 1984, when China leased two giant pandas to the United States, in coincidence of the Olympic Games (United Press International, 1984).

[10] According to our dataset, 25 zoos across 13 countries and territories in the United States, Europe, and Asia host 29 different pandas under short-term leasing agreements.

[11] The plan was published by the WWF in 1991 and approved two years later by the Chinese Forest Administration.

[12] Nevertheless, 12 of them were still a gift.

[13] The number of years between the birth of a panda cub and its return to China varies by country but is typically no more than three or four years. Additionally, countries must pay extra fees during this period to keep the cub, as it remains the property of China.

macy is a logical and appropriate choice. Although pandas are no longer gifted but leased, their reproduction has become central to the success of the diplomatic effort. In contrast, during the second phase, pandas were primarily loaned for commercial gain, with no concern for conservation and with little role for diplomacy. In the first phase, despite pandas were offered as diplomatic gifts, little attention was paid to the conservation of the species, giving less value to panda births. Overall, it is possible to conclude that while the primary goal of panda diplomacy is to strengthen geopolitical ties, the commitment to the protection and conservation of the species is a crucial aspect of these agreements.

3.2.3 Why giant pandas?

According to O'Brien et al. (1994), the habitat of giant pandas is limited to six unconnected areas of alpine bamboo forest within a few Chinese provinces, granting China a unique monopoly over them. Pandas typically live in small groups that are separated from each other by nature and human settlements, making the species demographically and genetically vulnerable. Furthermore, females are fertile for only 24-72 hours per year, usually during the Winter-Spring season (Buckinghamn et al., 2013; Hartig, 2013), posing additional challenges for their breeding. Finally, their diet is based 99% on bamboo also making pandas vulnerable to natural events.[14] Due to these factors, the International Union for the Conservation of Nature (IUCN) classified the giant panda as an endangered species in 1990, when the population amounted to only 1,114 individuals.[15]

The decline in the number of pandas is attributed to deforestation of their natural habitat and increased human activity in the region. However, their breeding difficulties also play a key role and contribute to the symbolic value of the panda, which can be strategically exploited as part of animal diplomacy. Indeed, in addition to their limited fertility period, their pregnancy, which lasts approximately 95-160 days, represents a particularly delicate time for female pandas (Hartig, 2013). Moreover, in captivity, pandas have very low chances of mating naturally. For this reason, zoos

[14] In 1978 and 1983, mass-bamboo flowering caused starvation and the 2008 Sichuan earthquake caused damages to panda habitat.

[15] According to the World Wildlife Fund (WWF), the first census of giant pandas conducted between 1974 and 1977 recorded a population of 2,459 individuals in the wild, distributed across various bamboo forest regions. However, a subsequent survey conducted between 1985 and 1988 revealed a sharp decline, with the population estimated at just 1,114 pandas. The third survey, published in 2004, offered more hopeful findings, estimating the wild population at 1,596 individuals. Information about the survey can be found at https://wwf.panda.org/what_we_do/endangered_species/giant_panda/panda/panda_survey.

often resort to assisted natural mating and artificial insemination, both of which require significant effort, constant monitoring, and do not guarantee success. Zoos often face challenges in confirming a panda's pregnancy with certainty, yet any announcement of a pregnancy immediately captures public and media attention.

After the panda is born, the baby is monitored for a few months while living alone with its mother, separated from the rest of the family. Thus, when the puppy reaches 100 days from birth, it receives a Chinese name and makes its public debut. The political relevance of this occasion is evident from media coverage, which highlights the presence of various political exponents. The Smithsonian's National Zoo & Conservation Biology Institute (2013) reports that during the 100-day celebration of the giant panda cub at the Smithsonian's National Zoo—named Bao Bao—special video messages were sent from the First Lady of the United States, Michelle Obama, and the First Lady of the People's Republic of China, Peng Liyuan, congratulating the National Zoo on the successful birth of the cub. Two years later, both First Ladies attended in person the same celebration for Bei Bei, young sister of Bao Bao (The Washington Post, 2015). Similarly, numerous media outlets report the attendance of government officials and China's ambassador to the host countries during the 100-day naming ceremonies.[16] Thus, the birth of a giant panda is expected to enhance and strengthen political relations, particularly around 100 days later, when politicians typically participate in the public naming ceremony.

3.2.4 Panda diplomacy and trade relations

Starting with the seminal paper by Pollins (1989), the literature has well identified that international trade typically reacts to countries diplomatic and political strategies. Therefore, it is a suitable outcome to study the effect of panda diplomacy.

Panda diplomacy may influence trade relations with China both when giant pandas are leased to foreign zoos and when a cub is born abroad. The leasing of a panda typically signals a diplomatic rapprochement and a relaxation of geopolitical tensions, which can facilitate bilateral trade by fostering a more cooperative political climate. This symbolic gesture can affect both exports to and imports from China. In addition, by functioning as a Chinese cultural export, panda diplomacy may additionally boost imports from China by reinforcing public goodwill toward Chinese

[16]For example, in Austria the ceremony was attended by the ministers of economy and tourism, in Canada by Prime Minister Justin Trudeau, and in France by the First Lady.

products. However, it frequently coincides with the signing of trade or other strategic agreements, making the precise identification of its effects unclear. As suggested by Buckinghamn et al. (2013), Hong Kong, Macao, Malaysia, and Singapore received a couple of pandas in a few years after they finalized a free trade agreement (FTA) with China, while Canada, France, and Scotland received them after concluding specific deals.[17]

In contrast, the birth of a panda cub is largely exogenous from a political and trade perspective. Interpreted by Chinese authorities as the emergence of a new diplomatic envoy, such an event can still strengthen bilateral relations by improving China's political goodwill toward the host country. In particular, consistent with the literature on political alignment and trade with China, such an event may lead to a rise in exports to China. The event also generates additional opportunities for diplomatic contact and public visibility, helping to strengthen political engagement between the two nations. Thus, the mechanism operates through an improvement in China's political goodwill toward the host country, which prompts Chinese authorities to increase imports from that country as a form of diplomatic reward. This reward is made possible by the extensive influence of the Chinese government over its economy, which allows political leaders to align trade flows with diplomatic priorities (Fuchs & Klann, 2013). At the same time, the presence of pandas in foreign zoos may also contribute to increased imports from China, as it strengthens cultural affinity and generates a more favorable public attitude toward Chinese culture and products. In this context, panda diplomacy exemplifies China's ability to integrate political and economic strategies, reinforcing ties with friendly nations while discouraging alignment with rivals.

We therefore focus our main analysis on the birth of panda cubs, while providing only preliminary evidence on the trade correlations surrounding panda leasing. Panda births are largely unpredictable and generate substantial political and media attention, making them a compelling setting in which to study the interaction between diplomacy and trade. Thus, our main hypothesis is that the birth of a panda cub has a positive effect on hosting countries' exports to China, for two main reasons. First, a new panda symbolizes the presence of a new ambassador between the two countries, reinforcing their political ties (The Washington Post, 2023). Moreover, given China's strong emphasis on species conservation, the birth of a cub in a partner country is viewed as a significant and joyful event, highlighting the host nation's role in conservation efforts and reflecting positively on its

[17] It should be noted that anecdotal evidence suggests that countries receiving pandas are often among China's largest trade partners (Financial Times, 2017).

collaboration with China.[18]

One potential concern is that panda births may depend on the effort or resources of individual zoos, potentially undermining their exogeneity. However, we find no publicly available evidence—such as news reports or studies—indicating that some zoos are significantly more committed or invest more resources than others. Importantly, when a panda cub is born abroad, the Chinese government consistently celebrates the event, regardless of the specific efforts made by the zoo. This suggests that what matters most is the outcome, not the process. Moreover, it is well established that China leases pandas only to zoos that meet specific standards (Buckinghamn et al., 2013)—those with the financial resources, facilities, and expertise required to ensure the pandas' well-being and support successful breeding. As a result, the zoos in our sample are all highly resourced and well-equipped, minimizing variation in their ability to facilitate panda births.

To date, no study has systematically examined bilateral trade flows in the context of panda diplomacy; existing quantitative work has focused on tourism rather than trade in goods. Given the clear political dimension of panda diplomacy and the mechanisms outlined above, we have reason to expect potential increases in both imports and exports following a panda's arrival as well as following a panda birth. Consequently, this paper aims to provide a comprehensive assessment of these links by quantifying the trade correlations associated with both leasing and birth events and by analyzing effects on both imports from China and exports to China. Our motivating hypotheses and the expected channels are summarized in Table 3.1. The next section presents the data and the methodology.

3.3 Data

To perform the analysis we build the *Panda Diplomacy Dataset* which collects information about the Chinese panda diplomacy and we combine it with UN Comtrade data to get information about countries' trade with China, and with other economic and political variables.[19]

[18] Although the death of a giant panda may be seen as a negative shock related to China—and it would be interesting to investigate whether such an event has an impact on trade with China—we are unable to determine whether the cause of death is natural or due to human error. Moreover, there are only 13 such events in our sample period, which limits our ability to conduct a meaningful analysis.

[19] We include the partner country real GDP and population, and the real exchange rate of partner country's LCU with Yuan from the World Development Indicators provided by the World Bank (2024), data on regional trade agreements from the WTO (2025), bilateral tariff from TRAINS by UNCTAD (2025) accessed via WITS, and data about UN ideal

Table 3.1: Panda diplomacy and trade

	Leasing *(Endogenous)*	**Birth** *(Exogenous)*
Exports to China	Signals diplomatic rapprochement and frequently accompanies state-level or trade agreements, creating a politically favorable environment that can facilitate partner-country exports to China.	An unexpected, highly publicized event (e.g., the 100-day naming ceremony) that generates political goodwill and symbolic recognition of the host's conservation role, potentially translating into increases in exports to China.
Imports from China	Acts as a form of Chinese cultural outreach and a signal of trust, raising bilateral visibility and market ties; this can increase demand for Chinese products and be accompanied by import-friendly arrangements.	Media attention and cultural ceremonies amplify Chinese soft power and cultural proximity, which may boost consumer affinity and imports from China in the host country.

Notes: Summary of the relation between panda diplomacy events and trade with China.

The *Panda Diplomacy Dataset* is a core contribution of this paper. It records international transfers of giant pandas in captivity between China and foreign countries, as well as births and deaths in hosting zoos worldwide, covering the period 1941-2024. As a starting point, we collected information on the first and second phases of panda diplomacy from Songster (2018). For the third phase, we relied on contemporary institutional and demographic sources. In particular, we used the institutional listings published by the Chengdu Research Base of Giant Panda Breeding, which report some of the zoos currently hosting giant pandas, the number of resident individuals, and recorded births.[20] These data were complemented with information from the World Population Review on the number of giant pandas living in each country, allowing us to identify pandas involved in the most recent phase of panda diplomacy.[21]

For all three phases, the initial information obtained from these sources was systematically verified and expanded through manual data collection. We reconstructed the history of each panda by consulting individual zoo websites (including animal profiles and archival materials), official press releases, and international news coverage, which allowed us to cross-check reported events and to obtain precise dates and descriptions of transfers, births, and deaths.

Because each giant panda is identified by a proper name, we were able to trace individual life histories and reconstruct genealogical links across generations. For every panda in the dataset, we

point distance from Bailey et al. (2017). More details on the variables are reported in Table A8.

[20] The list is available at https://www.panda.org.cn/en/cooperate/international/.

[21] Data are available at https://worldpopulationreview.com/country-rankings/giant-panda-population-by-country.

record the name, sex, host country, hosting zoo, month and year of arrival and (when applicable) departure back to China, dates of any offspring (with an indicator for artificial insemination), and dates of death at the hosting zoo. Each record includes a direct source link (news article or official page) so that all observations are verifiable.

Overall, the dataset provides a comprehensive record of panda diplomacy events across all three phases. Coverage of the first and third phases is particularly complete. Transfers in the first phase were rare and politically significant, attracting substantial media attention, while in the third phase the endangered status of giant pandas and the diplomatic importance of their leasing and births ensured that these occurrences were widely covered by international news outlets. The main limitation concerns the second phase, during which panda loans were more frequent, often short-term, and primarily market-oriented rather than reproductive, making some of these exchanges less consistently documented.

Thanks to this information, we construct the policy-relevant indicators used in the analysis: (i) *Panda* that is equal to 1 if country *c* has at least a giant panda for some day during year t; (ii) *Panda Leasing* that is equal to 1 only in the year that China leases a giant panda to country *c*; (iii) *Panda Birth* that is equal to 1 when a cub is born in country *c* in year *t*. As the political effects on trade do not materialize immediately (Du et al., 2017), we define a panda as being born in year *t* if the birth occurred between November of year *t-1* and October of year *t*.

The dataset provides information about 132 distinct giant pandas sent from China, 39 of them as state gift, 93 in leasing, to 26 countries and territories over the period 1941 to 2024, together with 87 pandas cub born outside China.[22] Furthermore, the number of death in zoos outside China is 44, and the number of pandas that were sent back to their home country is 114, resulting in 61 giant pandas being outside China at the end of 2024.[23] Table 3.2 lists all zoos involved in panda diplomacy from 1941 to 2024, specifying the year the first panda arrived and the last year a panda was present, and the number of births that occurred in each zoo. This includes both pandas given as state gifts and those leased.

Despite the broad coverage of the *Panda Diplomacy Dataset*, our analysis focuses on the period 1994-2019, corresponding to the third phase of panda diplomacy. As discussed in Section 3.2.2, it

[22] It includes also the Chinese special administrative regions of Hong Kong and Macao, and Taiwan.

[23] Notice that we are not able to perfectly trace panda death and given back from North Korea in the 1960s-1980s as information are not available.

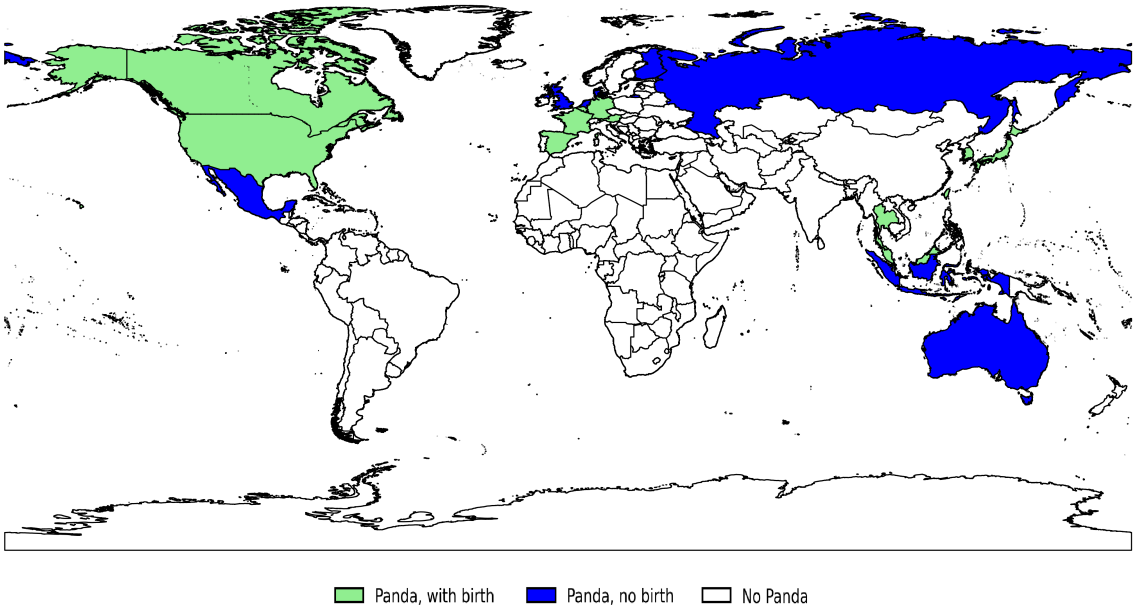
Table 3.2: Summary of Panda Diplomacy Dataset

Country	Zoo	Start Date	End date	Birth
Australia	Taronga Zoo - Melbourne Zoo	1988	1988	0
Australia	Adelaide Zoo	2009	ongoing	0
Austria	Schönbrunn Zoo	2003	ongoing	5
Belgium	Van Antwerpen Zoo	1987	1987	0
Belgium	Pairi Daiza	2014	2024	3
Canada	Toronto Zoo - Calgary Zoo	1985	2020	2
Canada	Assinboine Park Zoo	1989	1989	0
Denmark	Copenhagen Zoo	2019	ongoing	0
Finland	Ahtari Zoo	2018	2024	0
France	Zoo de Vincennes	1973	2000	0
France	ZooParc de Beauval	2012	ongoing	3
Germany	Berlin Zoo	1980	ongoing	4
Hong Kong	Ocean Park	1984	ongoing	2
Indonesia	Taman Safari Indonesia	2017	ongoing	0
Ireland	Dublin Zoo	1986	1986	0
Japan	Okayama - Hakodate Zoo	1988	1988	0
Japan	Adventure World	1988	ongoing	17
Japan	Yuki Park	1989	1989	0
Japan	Kobe Oji Zoo	2000	2024	0
Japan	Ueno Zoo	1972	ongoing	5
Macao	Parque de Seac Pai Van	2010	ongoing	2
Malaysia	Zoo Negara	2014	ongoing	3
Mexico	Chapultepec Zoo	1975	ongoing	7
Netherlands	Ouwehands Dierenpark	2017	ongoing	2
Netherlands	Safari Park Beerse Bergen	1987	1987	0
New Zealand	Auckland Zoo	1988	1988	0
North Korea*	Pyongyang Zoo	1965	1979	0
Qatar	Al Khor Panda House	2022	ongoing	0
Russia	Moskovsky Zoopark	2019	ongoing	1
Singapore	River Wonders	1990	ongoing	1
South Korea	Everland Zootopia	1994	ongoing	3
Soviet Union	Moscow Zoo	1957	1972	0
Spain	Zoo Aquarium de Madrid	1978	ongoing	7
Sweden	Eskilstuna Parken Zoo	1986	1986	0
Taiwan	Taipei Zoo	2008	ongoing	2
Thailand	Safari World Zoo	1992	1993	0
Thailand	Chiang Mai Zoo	2003	2023	1
United Kingdom	London Zoo	1946	1994	0
United Kingdom	Edinburgh Zoo	2011	2023	0
USA	Bronx Zoo - Busch Garden Florida	1941	1988	0
USA	Toledo Zoo	1988	1988	0
USA	Columbus Zoo	1992	1992	0
USA	Los Angeles Zoo -San Francisco Zoo	1984	1984	0
USA	San Diego Zoo	1987	ongoing	6
USA	Zoo Atalanta	1999	2024	7
USA	National Zoo in Washington	1972	ongoing	4
USA	Memphis Zoo	2003	2023	0
Total				87

Notes: Summary of the *Panda Diplomacy Dataset*. It reports the year when the first giant panda arrived in the zoo, the year when the last giant panda died or went back to China, and the number of cubs birth announced in each zoo. *Data about North Korea may be not complete due to lack of reliable information sources.

is during this phase that the birth of a giant panda takes on significant diplomatic value. We end the analysis in 2019 to exclude the COVID-19 period, as trade relations during the pandemic were significantly disrupted—though the effects varied across countries.

Figure 3.1: World map of panda diplomacy between 1994-2019



Notes: Colored countries represent those that hosted giant pandas at least once during the period 1994-2019. Green countries are the ones that experienced a birth of a panda cub, while blue ones not. In white are depicted countries that never had a panda during the sample period.

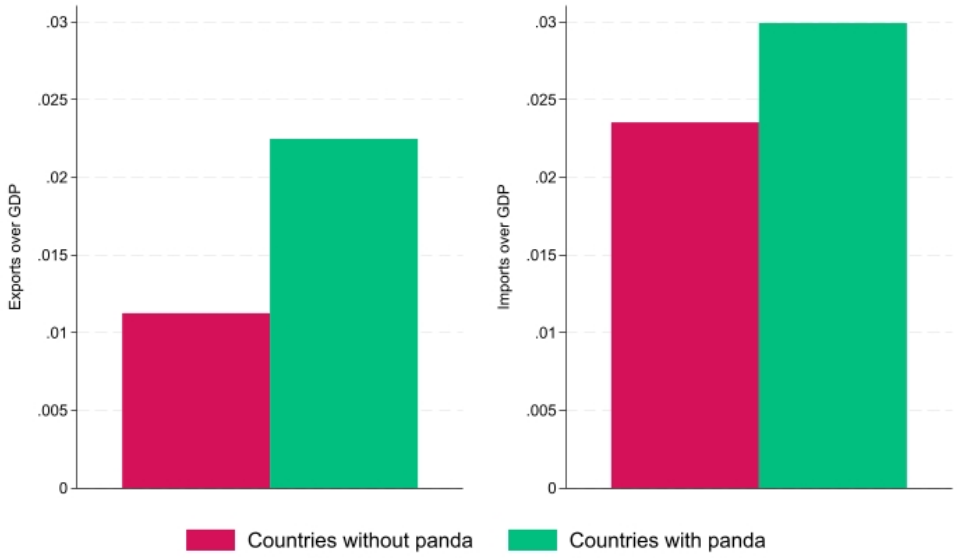
Figure 3.1 provides an overview of the countries participating in panda diplomacy during our sample period. Countries highlighted in blue hosted at least one giant panda between 1994 and 2019 but did not experience the birth of any cub, while those marked in green hosted pandas with at least one surviving cub.[24] During this period, there were 53 panda cubs in total, including 13 instances of twin births. This results in 40 distinct birth events, which serve as the basis for identifying the effect in our analysis. When focusing on the narrower time-frame of 2002-2019, the sample includes 50 panda cubs, of which 13 couple of twins, for a total of 38 distinct events. Overall, 20 countries have been involved in panda diplomacy during our sample period, and 10 of them have experienced the birth of a giant panda. Moreover, as shown in the figure, countries involved in panda diplomacy are typically advanced economies (15 out of 20) and are geographically concentrated in Asia and the Pacific (8), Europe (9), and North and Central America (3). They are also wealthier, with an

[24]During our sample period, Mexico is the only country to host pandas that are its own property, as they are the offspring of pandas gifted in 1975.

average real GDP per capita 2.6 times higher than that of other countries—potentially reflecting the financial capacity required to host giant pandas—and more populous, with a population 3.5 times larger on average. The larger population base may reflect China's interest in reaching broader audiences and maximizing the cultural impact of panda diplomacy.

Figure 3.2 presents a comparison of the ratio between exports to China and GDP (on the left) and imports from China and GDP (on the right) in countries involved in panda diplomacy (green bars) versus those not involved (red bars). As can be seen, countries engaged in panda diplomacy exhibit a higher ratio between exports to China and GDP (2.25%) compared to countries not involved (1.13%). Similarly, their ratio of imports from China and GDP is also higher (2.99%) than that of countries not involved (2.35%). This evidence is consistent with the results reported by Financial Times (2017), showing that China's major trade partners are the ones involved in panda diplomacy.

Figure 3.2: Trade with China and panda diplomacy, 1994-2019

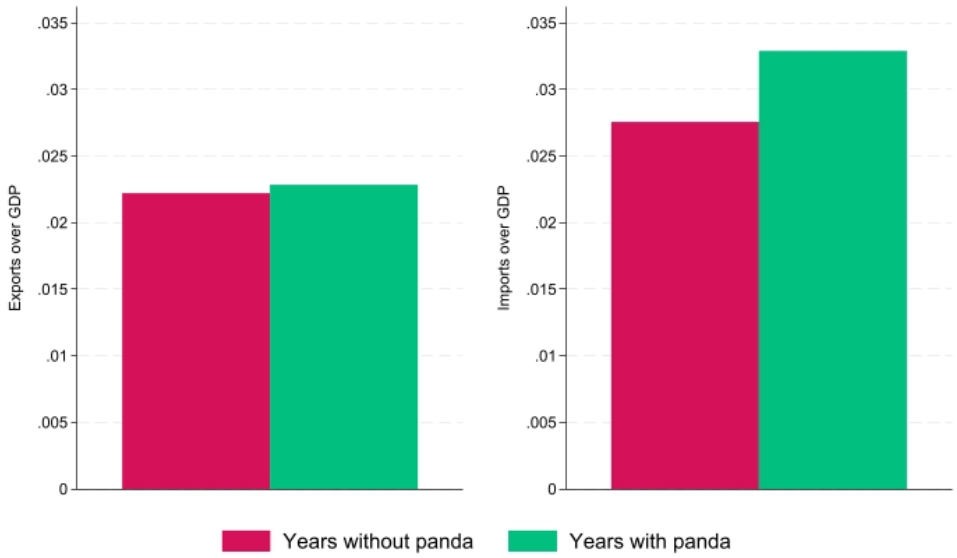


Notes: The graph on the left shows countries' average exports to China as a share of GDP, while the one on the right shows countries' average imports from China as a share of GDP. The red bar represents values for countries not involved in panda diplomacy during the period 1994-2019, while the green bar shows values for countries that hosted at least one giant panda.

Instead, Figure 3.3 illustrates the ratio of exports to China to GDP (on the left) and imports from China to GDP (on the right) in countries engaged in panda diplomacy, comparing periods when they have a panda (green bars) and when they do not (red bars). As shown, the export levels are quite similar, with panda diplomacy countries exporting 2.28% of their GDP when they have a panda and 2.21% when they do not. When it comes to import levels, panda diplomacy countries seem to

import more from China (3.29% of their GDP) when they have a panda compared to years in which they do not have it (2.75% of their GDP). Although this might reflect the influence of a form of cultural diplomacy, the arrival of giant pandas may coincide with the conclusion of trade agreements (Buckinghamn et al., 2013).

Figure 3.3: Trade with China before and after the arrival of a panda, 1994-2019



Notes: The graph on the left shows countries' average exports to China as a share of GDP, while the one on the right shows countries' average imports from China as a share of GDP. The red bar represents values for countries involved in panda diplomacy before receiving pandas during the period 1994-2019, while the green bar shows the values after they received pandas.

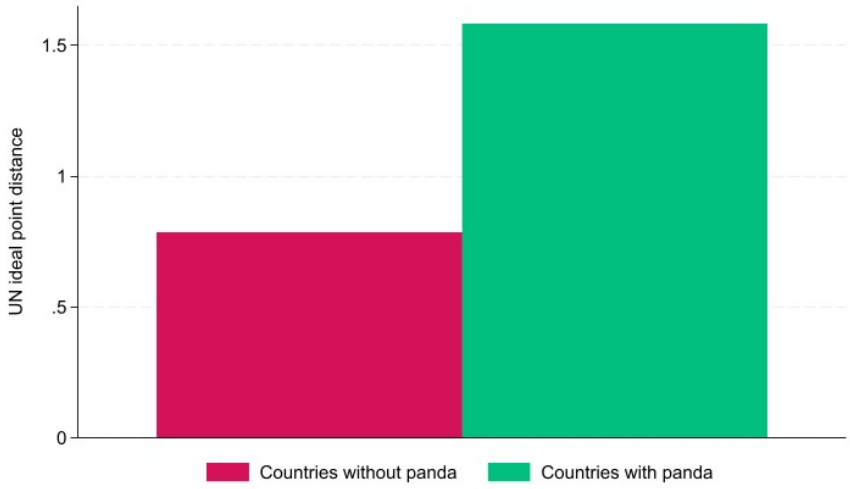
Finally, Figure 3.4 shows the average UN ideal point distance from China for countries involved in panda diplomacy (green bar) and those that are not (red bar). This variable is commonly used in the literature as a proxy for political alignment between countries (Bailey et al., 2017). Specifically, lower absolute distances (i.e., values closer to zero) indicate higher political alignment.[25] As can be seen, panda diplomacy countries register a higher value (1.6) than the others (0.8), suggesting that they tend to be less politically aligned with China.

Overall, the descriptive evidence suggests that countries involved in panda diplomacy are geographically concentrated in advanced economies and in China's immediate neighborhood. Although wealth and population size may play a role in determining which countries host pandas, China appears to select partners primarily among its major trading counterparts, regardless of political

[25] Following Bailey et al. (2017), we compute this measure as the absolute difference between the ideal point of country c and that of China in a given year. Individual country ideal points are derived from their voting patterns in the UNGA.

affinity. This pattern supports the view that panda diplomacy serves as a strategic instrument to ease political tensions and strengthen ties with economically strategic partners. The next section presents the methodology.

Figure 3.4: Countries' UN ideal point distance with China, 1994-2019



Notes: The red bar represents the average ideal point distance with China in the UN for countries not involved in panda diplomacy during the period 1994-2019, while the green bar shows the same measure for countries that hosted at least one giant panda.

3.4 Methodology

In our work, we examine the effect of panda diplomacy on international trade with China over the period 1994-2019 by estimating a gravity-type model regression.[26] The gravity model of trade assumes that bilateral trade is proportional to the product of the trading countries' economic masses—proxied by their GDP—and inversely proportional to the geographic distance between them. We also include country fixed effects to control for time-invariant heterogeneity, year fixed effects to account for global shocks, and several time-varying control variables. Notably, the inclusion of partner country fixed effects absorbs factors commonly used in gravity models, such as bilateral distance, contiguity, and common language. We estimate all specifications using a Poisson Pseudo-Maximum Likelihood (PPML) estimator, as it allows for the inclusion of observations in which the value of trade is equal to zero and yields consistent estimates of the model coefficients—unlike

[26]We exclude Hong Kong and Macao from the analysis, as they are Chinese Special Administrative Regions, and Taiwan, for diplomatic reasons.

OLS, which may produce biased results in gravity models (Santos Silva & Tenreyro, 2006).[27]

We begin our analysis by providing suggestive evidence that the leasing of giant pandas is positively correlated with trade. Specifically, we estimate the export and import dynamics of partner country *c* to and from China, in the years surrounding the arrival of giant pandas, as follows:

$$trade_{c,t} = exp\{\beta_0 + \sum_{j=-4}^{4} \beta_{1,j} PandaLeasing_{c,t+j} + \boldsymbol{\theta X_{c,t}} + \delta_c + \gamma_t + \varepsilon_{c,t}\} \quad (3.1)$$

where $trade_{c,t}$ denotes, in one specification, the value of exports from partner country *c* to China ($exports_{c,t}$), and in another specification, the imports of partner country *c* from China ($imports_{c,t}$), in year *t* and in constant (2010) US$. The variable $PandaLeasing_{c,t+j}$, with $j = -4, -3, ..., +4$, is a dummy variable equal to 1 in year $t + j$ if country *c* receives at least one giant panda from China, and 0 otherwise.[28] That is, the dummy takes the value 1 only in the year the panda arrives, and not in subsequent years. $\boldsymbol{X_{c,t}}$ is a vector of controls for country *c* in year *t* as in the trade gravity model literature (Fuchs & Klann, 2013; Rose, 2007) and it includes: the logarithm of partner country's real GDP in US$, the logarithm of partner country's population, the logarithm of the real exchange rate of partner country's local currency unit in Yuan, a dummy variable that equals 1 if China has a regional trade agreement (RTA) in force at least at the end of June of year t with the partner country, the logarithm of bilateral tariff rate (plus 1) applied by the importing country, and the amount of exports (imports) of country c towards territories different from China, divided by its GDP.[29] Finally, δ_c and γ_t denote country and year fixed effects, and the standard error is clustered at the country level since it is the level of treatment. The coefficients of interest are the $\beta_{1,j}$ terms as they capture the dynamic effect of the leasing of a panda on a country's trade with China.

We then test our main hypothesis on whether trade of country *c* with China is influenced by the birth of a panda cub in a zoo located in country *c* in year *t* estimating the following equation:

$$trade_{c,t} = exp\{\beta_0 + \beta_1 PandaBirth_{c,t} + \beta_2 Panda_{c,t} + \boldsymbol{\theta X_{c,t}} + \delta_c + \gamma_t + \varepsilon_{c,t}\} \quad (3.2)$$

[27] We consider partner country's exports to China equal to zero if in the same year the value of its total exports towards the rest of the world is positive. We consider it to be missing if the value of other exports is not available.

[28] Giant pandas are typically leased in pairs; however, if one becomes ill, ages, or passes away, China may choose to send a replacement panda or leave the position unfilled.

[29] More precisely, when we analyze exports to China, we refer to the tariff rate imposed by China on its partner countries. When we focus on imports from China, we refer to the tariff rate applied by partners to Chinese goods.

where $PandaBirth_{c,t}$ is a dummy variable equal to 1 if, in country *c*, a new panda was born between November of year *t-1* and October of year *t*.[30] All the other variables are the same as in Equation 3.1. In this specification we also control for the dummy variable $Panda_{c,t}$ which is equal to 1 during years in which country *c* has at least one giant panda. This control is crucial to address potential endogeneity in our estimates of β_1, as not all countries in our sample hosted pandas at all points in time. Even among countries engaged in panda diplomacy, pandas were received in different years, meaning that a panda birth is only possible when a country is already hosting pandas. Including $Panda_{c,t}$ thus helps control for the selection of countries involved in panda diplomacy. The coefficient of interest is β_1, as it captures the effect of the birth of a panda on a country's trade with China.[31]

Although Equation 3.2 allows us to estimate the effect of a panda born on country's exports to China, it does not give us any insights about the dynamics of the effect within the same year. Indeed, it is of interest to test for both parallel trend before and for the persistency of the shock to better understand the mechanism driving the results. Thus, in Section 3.6 we estimate trade dynamics exploiting monthly frequency data. In this way we can mitigate the aggregation bias that annual frequency data may generate (Du et al., 2017), and we can distinguish the effects of the different phases of the birth as discussed in Section 3.2.3. However, to perform the analysis, we use monthly data from the International Trade in Goods (by partner country) database provided by the IMF (2025) instead of data from UN Comtrade.[32] For these reasons, we estimate the following equation over a two-year window using real monthly export data:

$$\begin{aligned} exports_{c,m,t} = exp\{\beta_0 + \sum_{j=-12}^{11} \beta_{1,j} PandaBirth_{c,m+j,t} + \beta_2 Panda_{c,m,t} + \boldsymbol{\theta X_{c,m,t}} + \\ + \delta_c + \gamma_{m,t} + \tau_c t + \varepsilon_{c,m,t}\} \end{aligned} \tag{3.3}$$

where $exports_{c,m,t}$ is the value of real exports of partner country *c* to China in month m of year *t* in US$, and $PandaBirth_{c,m+j,t}$ is a dummy variable that equals 1 if a new panda was born in country

[30] As discussed in Section 3.3, this choice reflects evidence that the effects of political shocks on trade do not materialize immediately and tend to persist for about two months (Du et al., 2017). This assumption is further supported by the monthly analysis presented in Section 3.6.

[31] In Section 3.7, we also confirm that the results remain consistent when disaggregating the data at the industry level and including both country-industry and year-industry fixed effects to capture sectoral heterogeneity.

[32] This choice was necessary because UN Comtrade monthly data are only available from 2010. However, the main results are robust to the use of IMF data and are available upon request.

c during month $m+j$ of year t, with $j = -12, -11, ..., +11$.[33] The vector of control variables, $\boldsymbol{X_{c,m,t}}$, includes the same covariates as in Equation 3.2, with the difference that the real exchange rate, other exports over GDP, *RTA*, and *Panda* are measured at a monthly frequency.[34] Additionally, δ_c and $\gamma_{m,t}$ denote country and period fixed effects, respectively, while $\tau_c t$ represents country-specific linear time trends.[35] Finally, the coefficients of interest are the $\beta_{1,j}$ terms, where $j = -12, -11, \ldots, +11$, as they capture the dynamic effect of the birth of a panda on a country's exports to China. Summary statistics of the main variables used are reported in Table A1 in the Appendix. The next section presents the results.

3.5 Results

We begin our analysis by examining the relationship between bilateral trade with China and the lease of giant pandas. As discussed in previous sections, the leasing of giant pandas may be endogenous to the determinants of trade, raising concerns about potential reverse causality. In addition, the timing of the effects might also depend on the capacity of the hosting zoo to provide suitable living conditions for the pandas. Therefore, the objective of this suggestive analysis is to assess the correlation between panda leases and patterns in bilateral trade.

Figure 3.5 shows the estimated dynamics of the coefficient associated with the variable *Panda Leasing* in Equation 3.1. Specifically, the left panel reports the estimates for exports to China from partner countries over the four years before and after each new panda lease, while the right panel shows the dynamics of China's imports from its partner countries. In the left panel, exports show a modest uptick in year -1 (coefficient ≈ 0.1) but fail to reach statistical significance (p=0.11), and then revert toward zero. This suggests only a weak and transient link between panda arrival and partner-country exports to China. By contrast, the graph on the right reveals a clear, sustained increase in partner countries' imports from China: coefficients climb steadily from about 0.05 in year -3 to 0.09 in year -1, with the 95% confidence band excluding zero for up to year $+4$. This pattern indicates a stronger correlation between panda leases and countries' procurement of Chinese goods. Together, these dynamics hint that while partner country exports may not systematically

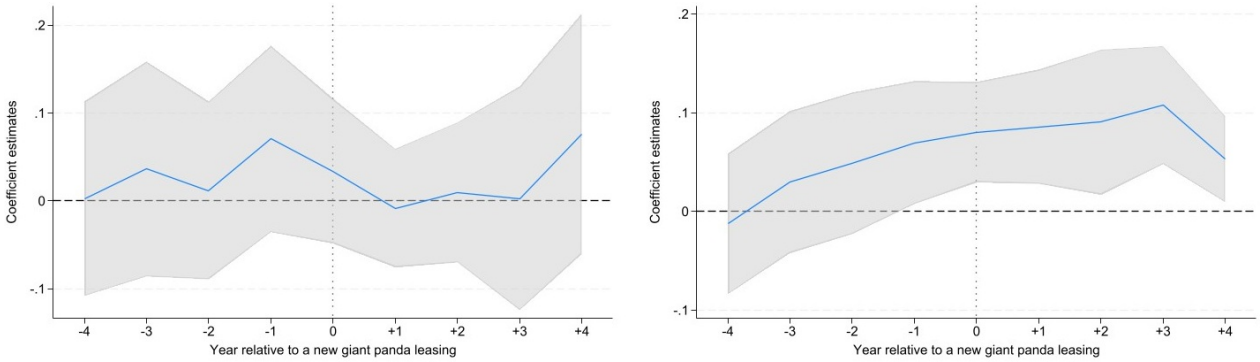
[33] The equation is not estimated for imports from China, as imports coefficient is not statistically different from zero in the baseline specification.

[34] Note that monthly export values are scaled by annual GDP, as monthly GDP data are not available.

[35] The inclusion of country-specific linear time trends in the month specification comes from Lin et al. (2019).

jump upon receiving pandas, countries seem to import more from China, potentially reflecting post-lease trade agreements or the broader effect of a cultural influence.

Figure 3.5: Export and import dynamics in countries that received giant pandas



Notes: The graph on the left presents the export dynamics to China of countries that received a panda, from four years before to four years after its arrival. Instead, the graph on the right depicts the corresponding import dynamics from China. The shaded areas represent 95% confidence intervals based on standard errors clustered at the partner country level and correspond to PPML estimates that include year and country fixed effects, along with the control variables specified in Equation 3.2.

Turning to our main hypothesis, the results of Equation 3.2 are presented in Table 3.3 for exports and in Table 3.4 for imports. The estimates examine the relationship between the birth of a panda cub and trade with China, using four different specifications that vary by sample period, i.e., 1994-2019 (columns 1 and 3) and 2002-2019 (columns 2 and 4), and sample composition, i.e., all countries (columns 1 and 2) and only those involved in panda diplomacy (columns 3 and 4).[36] Looking at Table 3.3 the effect of a panda birth on exports to China is consistently positive across all specifications. However, the level of statistical significance varies. In the sample covering the entire period from 1994 to 2019 (columns 1 and 3), the estimates are not statistically significant at conventional levels, with p-values of 0.17 and 0.19, respectively. In contrast, when focusing on the period from 2002 to 2019 (columns 2 and 4), which starts after China's inclusion in the WTO, the estimated effect becomes significant at the 1% level. For these specifications, the birth of a panda cub is associated with an increase in exports to China of 5.3% (column 2) when focusing on the sample of all countries and 7.4% (column 4) when the sample includes panda diplomacy countries only.[37] Compared to the results of Fuchs and Klann (2013), which report a reduction in exports

[36]Countries involved in panda diplomacy are those shown in Figure 3.1. Ireland, New Zealand, North Korea, Qatar, and Sweden, which hosted giant pandas outside the sample period, are not considered panda diplomacy countries.

[37]In Section 3.7, we show that after controlling for country-industry and year-industry dummies, the effect decreases to 4.9%.

to China as a consequence of receiving the Dalai Lama of approximately 16.9%, our coefficient is much smaller in absolute terms.

Table 3.3: Panda births and total exports to China

	Exports			
	(1)	(2)	(3)	(4)
Panda Birth	0.025	0.052***	0.034	0.072***
	(0.018)	(0.015)	(0.025)	(0.023)
Panda	0.025	0.015	0.052	0.024
	(0.090)	(0.087)	(0.078)	(0.069)
(log) GDP	0.770**	0.787*	0.390	-0.080
	(0.376)	(0.464)	(0.314)	(0.533)
(log) Population	0.803	0.376	2.264*	3.291**
	(1.066)	(1.156)	(1.161)	(1.635)
(log) Exchange Rate	-0.009	-0.128	-0.176	-0.542***
	(0.055)	(0.146)	(0.168)	(0.194)
Regional Trade Agreement	0.060	0.144	-0.018	-0.096
	(0.115)	(0.140)	(0.124)	(0.122)
(log) Tariff	-0.133**	-0.092	0.008	0.016
	(0.067)	(0.068)	(0.081)	(0.068)
Other exports to GDP	1.054***	0.859**	1.006**	1.037**
	(0.404)	(0.418)	(0.418)	(0.426)
Observations	3,538	2,726	512	360
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the real amount of partner countries' exports to China in US$. The independent variable of interest, *Panda Birth*, is a dummy equal to 1 if in year t in country c a giant panda is born. Control variables are: *Panda*, that is a dummy equal to 1 if in year t country c has a giant panda, *log(GDP)* that is the logarithm of real GDP in US$ of the partner country, *log(Population)* which is the logarithm of partner country population, *log(Exchange rate)* that is the logarithm of the real exchange rate between partner country LCU and Yuan, *Regional Trade Agreement* that is a dummy equals 1 if China has a regional trade agreement in force at least at the end of June of year t with the partner country, *log(Tariff)* that is the logarithm of exports tariff (plus 1), and *Other exports to GDP* denotes the total amount of exports of the partner country towards territories different from China over its GDP. All columns include country and year fixed effects. Columns 1 and 3 refer to the period 1994-2019, while columns 2 and 4 to the period 2002-2019. Columns 3 and 4 include only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Instead, looking at Table 3.4, the effect of a panda birth on imports from China is not significant across all specifications, although it appears positive when focusing on the period after China's accession to the WTO. Overall, these results are consistent with the view that, as an autocratic state, China can more readily adjust its trade policy in favor of political allies (Fuchs & Klann, 2013), whereas democratic countries—the usual recipients of panda diplomacy—may lack such flexibility. Furthermore, the variable $Panda_{c,t}$ is never statistically significant in either table, indicating that

hosting a giant panda does not drive higher trade with China. While the act of leasing a panda may coincide with the conclusion of specific trade agreements or symbolize positive diplomatic relations, it is not reasonable to expect trade to remain higher throughout the entire hosting period. Panda leases typically last at least ten years, during which bilateral relations with China may be subject to both positive and negative changes.

Table 3.4: Panda births and total imports from China

	Imports			
	(1)	(2)	(3)	(4)
Panda Birth	-0.018	0.019	-0.012	0.026
	(0.018)	(0.020)	(0.016)	(0.019)
Panda	-0.027	-0.047	0.001	-0.017
	(0.034)	(0.035)	(0.046)	(0.047)
(log) GDP	1.817***	1.702***	1.722***	1.619***
	(0.255)	(0.229)	(0.557)	(0.536)
(log) Population	0.525	0.387	0.580	0.321
	(0.620)	(0.431)	(1.485)	(1.416)
(log) Exchange Rate	-0.095**	-0.183**	-0.182	-0.431***
	(0.038)	(0.090)	(0.122)	(0.154)
Regional Trade Agreement	-0.097	0.013	-0.163	-0.058
	(0.102)	(0.092)	(0.135)	(0.134)
(log) Tariff	-0.123**	-0.101**	-0.110	-0.080
	(0.055)	(0.044)	(0.070)	(0.052)
Other imports to GDP	1.296***	1.175***	1.326***	1.344***
	(0.284)	(0.277)	(0.463)	(0.481)
Observations	2,932	2,383	480	356
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

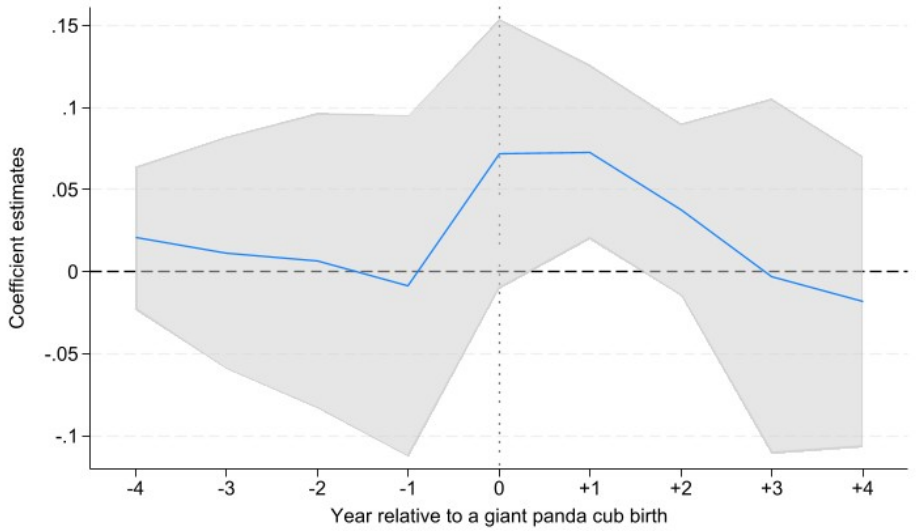
Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the real amount of partner countries' imports to China in US$. The independent variable of interest, *Panda Birth*, is a dummy equal to 1 if in year t in country c a giant panda is born. See notes to Table 3.3 for control variables specification. All columns include country and year fixed effects. Columns 1 and 3 refer to the period 1994-2019, while columns 2 and 4 to the period 2002-2019. Columns 3 and 4 include only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Figure 3.6 presents the estimated dynamic effects of panda births on exports over time, using the specification of column 4 of Table 3.3 as general results are significant over this time window.[38] As shown, in the year of panda birth (year = 0), there is a jump in countries' exports to China, which is significant at the 10% level (p-value = 0.087). The effect remains higher and significant at the 5%

[38]Results on imports are not reported as the main analysis is not significant, but they are available upon request. However, they confirm the same findings.

level in the following year, but is no longer statistically significant from the second year onward, when it reverts to zero. Reassuringly, the coefficients in the four years preceding the shock do not exhibit a significant trend and remain close to zero, suggesting that the birth of the panda could not be anticipated. The next section explores the mechanism underlying the observed increase in exports.

Figure 3.6: Annual export dynamics in panda diplomacy countries when experiencing pandas' birth



Notes: It presents the export dynamics in panda diplomacy countries from four years before to four years after the birth of a cub (year = 0). The shaded areas represent 95% confidence intervals based on standard errors clustered at the partner country level, and correspond to PPML estimates that includes country and year fixed effects, and controls as in column 4 of Table 3.3.

3.6 Mechanism

Since China is an autocratic country, we might expect it to be less open to international trade than democracies (Mansfield et al., 2000), and typically to import less (Aidt & Gassebner, 2010). Furthermore, Fuchs and Klann (2013) show that the Chinese government exerts extensive influence over its economy, allowing political leaders to align trade flows with diplomatic objectives and strategic interests. Within this framework, the birth of a panda cub abroad represents a salient diplomatic event that can increase Chinese goodwill toward the host country and stimulate additional diplomatic interactions and public exchanges. This channel implies a temporary reorientation of Chinese import demand toward the host country rather than a structural shift driven by trade

policy.[39]

To pin down the timing of the mechanism, we start from high-frequency trade data. If the birth of a panda cub enhances Chinese goodwill, the effect on trade should materialize shortly after the event. In practice, improved relations may show up in direct communications between Chinese leaders and the leaders of recipient countries even in the absence of in-person meetings, as occurred in the Netherlands.[40] We further expect the effect to intensify around the 100-day naming ceremony, which typically represents the peak of public goodwill and often involves friendly, high-profile interactions between political leaders and Chinese diplomats. There is documented evidence of the participation of the Canadian Prime Minister, government ministers in Austria, Belgium, and Malaysia, and First Ladies in France and the United States at such ceremonies.[41] Thus, to capture changes in trade patterns that coincide with events related to panda births, we estimate Equation 3.3 using IMF monthly trade in goods data. Using monthly data is also important because the study of political and trade shocks can suffer from aggregation bias when annual data are used (Du et al., 2017).[42]

Figure 3.7 shows the dynamic monthly effects of panda births on exports to China over 2002–2019. We find no statistically significant differences in exports to China during the twelve months prior to the birth, suggesting that the event is unanticipated. Consistent with the goodwill hypothesis, a peak emerges around the third to fourth month after birth—which typically coincides with the 100-day naming ceremony—and the effects are short-lived, persisting for up to roughly seven months afterwards.

The short-lived nature of the shock suggests that the increase in trade is driven by temporary diplomatic goodwill rather than a permanent change in bilateral relations. This interpretation is consistent with the evidence that countries receiving pandas are generally less politically aligned with China (see Section 3.3). In particular, if a country is initially less aligned, there is more scope for an improvement in relations and goodwill; conversely, when a country is already aligned, the marginal

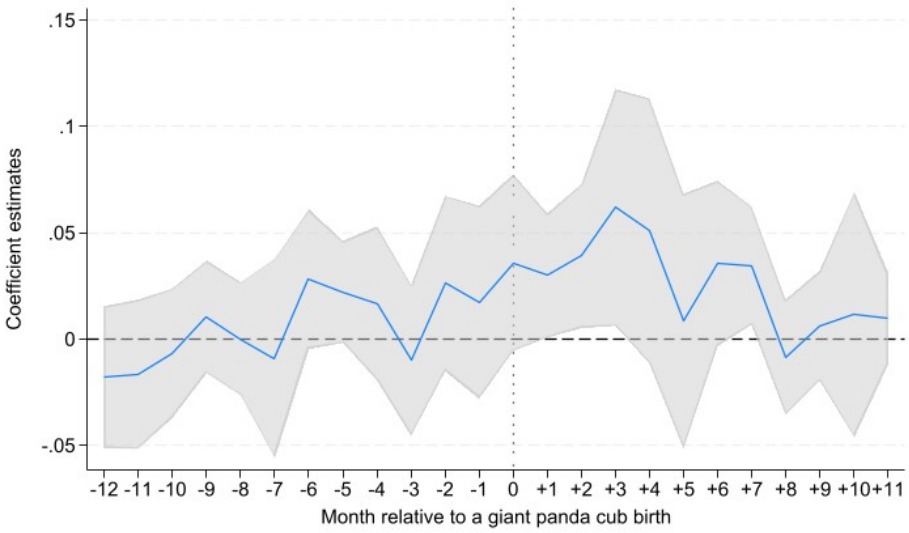
[39] It is worth noting that there is no evidence that around the time of a cub's birth, trade between China and the host country increases due to specific trade-related events—such as the signing of agreements, tariff reductions, or other trade policy changes—beyond the effect of improved diplomatic goodwill.

[40] For more details, see https://www.chinadaily.com.cn/a/202006/25/WS5ef438f8a3108348172554ba.html.

[41] See, for instance, evidence from Austria (https://www.zoovienna.at/de/news/diary-panda-twins/), Malaysia (https://www.nst.com.my/news/nation/2019/08/508957/second-giant-panda-born-malaysia-named-yi-yi) and the U.S. (https://www.nytimes.com/2015/09/27/us/first-ladies-reveal-name-of-precious-panda-cub.html).

[42] Du et al. (2017) argue that aggregation bias may arise when the natural duration of political shocks is shorter than the frequency at which they are measured, potentially leading to spurious causality in the estimated relationship.

Figure 3.7: Monthly export dynamics in panda diplomacy countries when experiencing pandas' birth



Notes: It plots export dynamics in panda diplomacy countries from twelve months before to eleven months after the birth of a giant panda cub (month = 0). Shaded areas represent 95% confidence intervals based on standard errors clustered at the partner-country level and correspond to PPML estimates including country and month-year fixed effects, country-specific linear trends, and controls as in Equation 3.3.

room for further improvement is limited. To test whether the effect is concentrated among less politically aligned countries, we divide countries into two groups based on their political proximity to China. Political alignment is measured using the UN ideal point distance between country c and China in year t (Bailey et al., 2017), defined as the absolute difference between the two countries' ideal points.[43] Lower absolute distances denote higher political alignment. Countries are classified as aligned or non-aligned using K-means clustering applied to their 2002 distances.[44] Using 2002 values mitigates endogeneity concerns arising if panda births themselves affected alignment and induced group switching. This procedure identifies 54 non-aligned and 131 aligned countries in the full sample, and 14 and 6 respectively among those engaged in panda diplomacy.

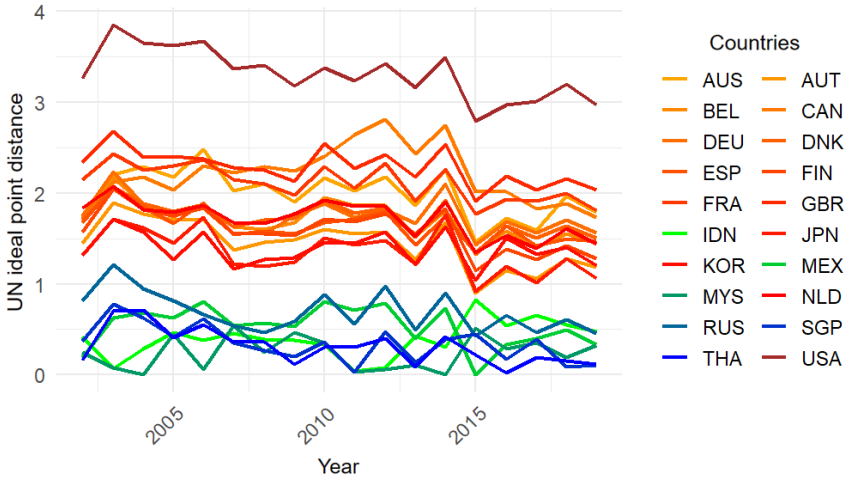
Figure 3.8 shows the evolution of UN ideal point distances for panda diplomacy countries over 2002-2019. Countries in the aligned cluster remain closer to zero throughout the period, while those in the non-aligned cluster remain farther from zero, indicating that the grouping reflects persistent

[43]Differently from the usual voting similarity index—defined as the share of UNGA votes in which two countries agree—this measure captures the distance between pairs of states in terms of their foreign policy preferences based on UNGA voting behavior.

[44]The K-means clustering algorithm partitions the sample into K clusters (here $K = 2$) by minimizing within-cluster variation, defined as the sum of squared Euclidean distances between each observation and the mean of its assigned cluster.

differences rather than short-run fluctuations.

Figure 3.8: Panda diplomacy countries' UN ideal point distance with China, 2002-2019



Notes: It shows the evolution of the UN ideal point distance between China and panda diplomacy countries over 2002–2019. Countries with a distance closer to zero are more politically aligned with China. The cluster of aligned countries (in green and blue) includes Indonesia, Malaysia, Mexico, Russia, Singapore, and Thailand. The cluster of non-aligned countries (in orange) includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, South Korea, the Netherlands, Spain, the United Kingdom, and the United States.

To test heterogeneity by alignment, we interact the panda-birth dummy $PandaBirth_{c,t}$ with two group indicators: $NotAligned_c$ and $Aligned_c$. The coefficient on $PandaBirth_{c,t} \times NotAligned_c$ captures the average effect of a panda birth on trade in year t for less aligned countries, while $PandaBirth_{c,t} \times Aligned_c$ captures the corresponding effect for aligned countries.[45] Table 3.5 reports the corresponding estimates. The interaction between *Panda Birth* and the non-aligned indicator is positive and statistically significant, while the interaction with the aligned indicator is not statistically different from zero and often negative. This pattern is consistent with a mechanism of temporary political goodwill that has more scope to operate in less aligned countries.[46]

Finally, since the shock appears to operate through a temporary improvement in diplomatic relations, we expect the export increase to occur primarily in goods with short production cycles or that can be easily traded. We therefore disaggregate total exports following Rauch (1999) into homoge-

[45] As a robustness check, we interact $PandaBirth_{c,t}$ with time-varying measures of *Not Aligned* and *Aligned* instead of using their static 2002 values. The results remain unchanged. Moreover, the findings remain robust when adding the time-varying measure as a separate explanatory variable. Results are available upon request.

[46] We also test whether the effect on imports from China varies with the degree of political alignment with China. However, we do not find statistically significant results for either aligned or non-aligned countries.

Table 3.5: Births in politically aligned vs not-aligned countries

	Exports	
	(1)	(2)
Panda Birth × Not Aligned	0.060***	0.079***
	(0.013)	(0.022)
Panda Birth × Aligned	-0.071	-0.037
	(0.056)	(0.045)
Panda	0.017	0.025
	(0.087)	(0.070)
(log) GDP	0.790*	-0.072
	(0.464)	(0.531)
(log) Population	0.385	3.321**
	(1.159)	(1.631)
(log) Exchange Rate	-0.127	-0.536***
	(0.145)	(0.192)
Regional Trade Agreement	0.143	-0.098
	(0.140)	(0.121)
(log) Tariff	-0.094	0.014
	(0.068)	(0.067)
Other Exports to GDP	0.858**	1.041**
	(0.417)	(0.421)
Observations	2,639	360
Country & Year FE	Yes	Yes
Only countries in panda diplomacy		Yes

Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the real amount of partner countries' imports to China in US$. The regressors of interest are the interactions between *Panda Birth*, a dummy equal to 1 if in year t in country c a giant panda is born and: *Not Aligned*, a dummy equal to 1 if country c belongs to the group of countries that are not politically aligned with China, and *Aligned*, a dummy equal to 1 if country c belongs to the politically aligned group. See notes to Table 3.3 for controls. All columns include country and year fixed effects and refer to the period 2002-2019. Column 2 includes only countries with at least one panda in the sample period. Standard errors (in parentheses) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

neous goods traded on an organized exchange, reference-priced, and differentiated products.[47] The hypothesis predicts stronger effects for homogeneous and reference-priced goods and weaker effects for differentiated goods, which typically require longer production and adjustment horizons.[48] This prediction stands in contrast to the findings of Fuchs and Klann (2013), consistently with the distinct nature of the shocks considered. Although the negative diplomatic tensions—such as those related to the visit of the Dalai Lama—may induce governments to accept higher economic costs in order to credibly signal resolve, a positive and short-lived improvement in diplomatic relations pro-

[47]Operationally, using the R package `concordance`, we first convert 6-digit HS products to SITC Rev. 2, and then map them to the Rauch (1999) categories.

[48]Following Rauch (1999), homogeneous goods are standardized products traded on organized exchanges, such as cereals, crude oil, or gold. Reference-priced goods are products whose prices are not set on organized exchanges but are listed in specialized trade publications, such as certain chemicals, steel products, or standardized industrial inputs.

vides little incentive to incur the substantial adjustment and relationship-specific costs associated with differentiated goods. Instead, such shocks may foster trade expansion where substitutability is high and adjustment is fastest and least costly. Consistent with this mechanism, Table 3.6 confirms this prediction: the effects are concentrated in homogeneous and reference-priced goods, while differentiated goods do not respond significantly. The next section presents some robustness checks.

Table 3.6: Panda birth and exports to China, Rauch classification

Rauch classification	Share of exports	Panda Birth	Std Error	Obs
Reference-priced goods	19.28%	0.0859**	(0.0342)	360
Homogeneous goods	15.19%	0.0957**	(0.0478)	360
Differentiated goods	55.45%	0.0355	(0.0237)	360

Notes: Country-panel PPML estimates from separate regressions by product type. The dependent variable is the real amount of exports to China in US$ for each product type according to Rauch (1999). The regressor of interest, *Panda Birth*, is a dummy equal to 1 if in year t in country c a giant panda is born. See notes to Table 3.3 for controls. All models include country and year fixed effects, refer to 2002–2019, and include only countries with at least one panda in the sample period. Standard errors (in parentheses) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

3.7 Robustness analysis

This section presents a robustness analysis of our main results. We begin by exploring a series of alternative specifications. Next, we address potential threats to the identification of our main model, and investigate potential issue related to sample dependence. All corresponding tables are reported in the Appendix.

3.7.1 Alternative specifications

We start by presenting the results of the main analysis specified in Equation 3.2, defining the variable $PandaBirth_{c,t}$ as a dummy equal to 1 if a panda was born in country *c* during year *t*, without shifting births occurring in November and December to the following year. While we consider the specification used in Table 3.3 to be the most accurate for identifying the effect, it is important to demonstrate that this adjustment in variable handling does not significantly alter the results.

Table A2 shows that the effect remains consistently positive and significant, confirming that shifting the births in November and December to the following year is not the factor driving the effects observed in the main results. However, the estimates in this specification are less pronounced and statistically weaker than those in the original model. This supports our conclusion that the initial specification is better suited to capturing the effect of panda births on exports to China, as the impact is primarily concentrated in the months following the birth.

In addition, we replace the dummy variable *Panda* with the number of female pandas a country has. This allows us to account for the fact that countries with more female pandas may have a higher probability of experiencing a panda birth. At the same time, countries that are left with only male pandas are coded as zero, since births are not possible in such cases.[49] As shown in Table A3 results are consistent with the baseline specification, and even the sample starting from 1994 is significant at the 10% level.

3.7.2 Identification

To verify that the results are not driven by country-specific yearly dynamics, we conduct a placebo analysis in which exports to China are replaced with exports to a country unrelated to panda diplomacy or to China more broadly. Specifically, we focus on exports to Suriname, as it is located in one of the two regions that have never hosted panda diplomacy (i.e., Africa and South America), has no regional trade agreement with China, and has never received an official visit from a Chinese leader. Table A4 shows that the coefficient on panda births is never statistically significant in any specification.[50]

3.7.3 Sample dependence

A potential threat to our analysis is represented by the fact that a particular panda diplomacy country that experienced a birth, or a particular year, may drive our results. To address this concern, we re-estimate the specification in column 4 of Table 3.3 by excluding one partner country of the panda diplomacy that experienced at least one birth at a time and then excluding one year at a time among

[49] Note that births are still possible in the absence of a male partner, as female pandas can be artificially inseminated.

[50] Note that in this case we cannot control for tariffs, as data for this variable in Suriname are available for only a limited number of years.

those considered. The coefficient of our variable of interest is always positive and significant.

The use of aggregate data does not allow us to account for sector-specific shocks and differences within countries' production systems, potentially biasing the estimated effect of the *Panda Birth* shock. In fact, when exports are aggregated at the country level, the estimated effect may mechanically absorb sector-specific dynamics. For instance, if certain sectors respond more strongly to other policy changes—such as the introduction of sector-specific restrictions by China—and a country is heavily specialized in those sectors, the *Panda Birth* variable may appear correlated with these dynamics, even though there is no link to panda births. To that end, we improve the granularity of the analysis by distinguishing traded products according to the 2-digit HS system. This allows us to include country-industry fixed effects to account for industry-specific time-invariant factors within each country, and year-industry fixed effects to control for industry-specific shocks over time. To ensure consistency with our previous findings, we replicate the analysis outlined in Equation 3.2, incorporating the new set of fixed effects alongside the other variables specified in Equation 3.2. Table A5 summarizes the results across the usual four specifications. As in the previous analysis, the variable *Panda Birth* remains positive and significant at least at the 5% level for the period 2002-2019, with the estimated effect decreasing to 4.9% in the preferred specification (column 4). In addition, since the coefficient of interest is much lower than the baseline results, we also verify whether the mechanism identified in Table A3 remains robust to the aforementioned changes. As reported in Table A6, the interaction between the *Panda Birth* variable and the dummy for non-aligned countries remains positive and highly significant, with the estimated effect decreasing to 5.3%. It is worth noting that once accounting for country-industry and year-industry dummies, the coefficient of the interaction with the dummy *Aligned* becomes positive but still not statistically different from zero.

As a final check, to better align with the specification by Fuchs and Klann (2013) we re-estimate our baseline results by replacing all economic variables expressed in real terms with their nominal counterparts. Table A7 shows that the results are significant even when extending the sample back to 1994. The next section concludes.

3.8 Conclusion

This paper studies the effects of panda diplomacy—a unique form of Chinese soft power—on political relations and international trade. Beyond its symbolic dimension, panda diplomacy operates as a foreign policy tool strategically employed by China toward countries that are either major trading partners or less politically aligned. Using comprehensive data from 1994 to 2019, we first document the correlation between the arrival of giant pandas in a country and bilateral trade with China. While export dynamics to China seem to be influenced—despite not statically significant—only prior to the leasing of pandas, China's imports from host countries exhibit a sustained and significant increase from roughly two years before up to four years after. Although these results are consistent with panda diplomacy acting as a signal of improved diplomatic relations, they do not allow us to adequately estimate the link between panda diplomacy and trade due to the endogeneity of panda leasing.

To address this limitation, we then examine trade dynamics around panda births, which—unlike leases—are unanticipated events and therefore less exposed to reverse causality. Panda births serve both as symbols of strengthened political ties and as recognition of host countries' conservation efforts. Our findings suggest that the birth of panda cubs is associated with a positive impact on exports to China, particularly in the post-WTO accession period (2002-2019). The increase in China's imports appears to be driven by a temporary improvement in political goodwill toward countries where a panda cub is born. Using monthly data, we show that this effect is short-lived and peaks around the months of the 100-day naming ceremony, which often involves informal meetings between recipient government officials and Chinese diplomats.

Importantly, the effect arises only among less politically aligned countries—those for which positive shifts in China's political preferences are more likely to occur. By contrast, politically aligned countries already enjoy stable relations with China, so the shock does not generate any significant effect for them. The temporary nature of the increase reflects its concentration among less politically aligned countries: once the goodwill effect fades, relations return to their usual, more distant state. In line with this interpretation, the increase in exports is concentrated in homogeneous and reference-priced goods, whose short production cycles and ease of trade adjustment make them more responsive to temporary shocks. By contrast, no effect is detected for differentiated goods, which typically involve longer production processes.

Taken together, these results speak directly to the current international economics debate on the growing role of geopolitical alliances in shaping economic outcomes. In an environment where political alignment increasingly conditions market access and input procurement, panda diplomacy creates a window of opportunity for recipient countries to leverage their inclusion in China's network of symbolic partnerships. Rather than merely reflecting existing alliances, panda diplomacy allows less politically aligned countries to temporarily strengthen their economic ties with China, particularly during episodes of heightened diplomatic visibility surrounding panda arrivals and births. Therefore, these episodes can be strategically used to facilitate short-term trade relations in sectors where adjustment is rapid. In the context of a changing global order characterized by the emergence of new geopolitical blocs and China's growing centrality, understanding the interaction between soft diplomacy and economic interests is increasingly important. Instead, from China's perspective, panda diplomacy operates as a subtle but effective form of geopolitical signalling that can be coordinated with broader diplomatic and economic objectives.

More broadly, the results also suggest that animal diplomacy should be taken seriously as a component of international relations, as an increasing number of countries are actively engaging in such practices.

Future research should quantitatively assess the determinants of panda diplomacy, as this may shed light on the geopolitical strategies underlying China's actions. In addition, it would be useful to evaluate whether other forms of animal diplomacy exhibit similar patterns, although precise data for such cases are not yet available.

References

Afesorgbor, S. K. (2019). The impact of economic sanctions on international trade: How do threatened sanctions compare with imposed sanctions? *European Journal of Political Economy*, *56*, 11–26.

Aidt, T. S., & Gassebner, M. (2010). Do autocratic states trade less? *The World Bank Economic Review*, *24*(1), 38–76.

Aranceta-Reboredo, O. (2022). And what about the animals? A case study comparison between China's panda diplomacy and Australia's koala diplomacy. *Animal Ethics Review*, *2*(1), 78–93.

Bailey, M. A., Strezhnev, A., & Voeten, E. (2017). Estimating dynamic state preferences from United Nations voting data. *Journal of Conflict Resolution*, *61*(2), 430–456.

BBC. (2024). A brief history of "panda diplomacy" - with new additions to global zoos [2024-08-08].

Berger, D., Easterly, W., Nunn, N., & Satyanath, S. (2013). Commercial imperialism? Political influence and trade during the Cold War. *American Economic Review*, *103*(2), 863–896.

Broz, J. L., Zhang, Z., & Wang, G. (2020). Explaining foreign support for China's global economic leadership. *International organization*, *74*(3), 417–452.

Buckinghamn, K., David, J., & Jepson, P. (2013). Diplomats and refugees: Panda diplomacy, soft "cuddly" power, and the new trajectory in panda conservation. *Environmental practice*, *15*(3), 262–270.

Che, Y., Du, J., Lu, Y., & Tao, Z. (2015). Once an enemy, forever an enemy? The long-run impact of the Japanese invasion of China from 1937 to 1945 on trade and investment. *Journal of International Economics*, *96*(1), 182–198.

CNN. (2024). They're cute, cuddly and coming to America: China's newest panda diplomats headed for Washington [2024-10-14].

Cruzatti, J., Dreher, A., & Matzat, J. (2023). Chinese aid and health at the country and local level. *World Development*, *167*, 106214.

Cushing, N., & Markwell, K. (2009). Platypus diplomacy: Animal gifts in international relations. *Journal of Australian Studies*, *33*(3), 255–271.

Davis, C. L., Fuchs, A., & Johnson, K. (2019). State control and the effects of foreign relations on bilateral trade. *Journal of Conflict Resolution*, *63*(2), 405–438.

Disdier, A.-C., & Mayer, T. (2007). Je t'aime, moi non plus: Bilateral opinions and international trade. *European Journal of Political Economy*, *23*(4), 1140–1159.

Dreher, A., Fuchs, A., Hodler, R., Parks, B. C., Raschky, P. A., & Tierney, M. J. (2019). African leaders and the geography of China's foreign assistance. *Journal of Development Economics*, *140*, 44–71.

Dreher, A., Fuchs, A., Hodler, R., Parks, B. C., Raschky, P. A., & Tierney, M. J. (2021). Is favoritism a threat to Chinese aid effectiveness? A subnational analysis of Chinese development projects. *World Development*, *139*, 105291.

Dreher, A., Fuchs, A., Parks, B., Strange, A. M., & Tierney, M. J. (2018). Apples and dragon fruits: The determinants of aid and other forms of state financing from China to Africa. *International Studies Quarterly*, *62*(1), 182–194.

Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. J. (2022). *Banking on Beijing: The aims and impacts of China's overseas development program*. Cambridge University Press.

Du, Y., Ju, J., Ramirez, C. D., & Yao, X. (2017). Bilateral trade and shocks in political relations: Evidence from China and some of its major trading partners, 1990–2013. *Journal of International Economics*, *108*, 211–225.

Fan, J., & Lu, B. (2021). The impact of summit visits on bilateral trade: Empirical evidence from China. *The World Economy*, *44*(12), 3583–3608.

Financial Times. (2017). Panda politics: The hard truth about China's cuddliest diplomat [2017-11-03].

Fuchs, A., & Klann, N.-H. (2013). Paying a visit: The Dalai Lama effect on international trade. *Journal of International Economics*, *91*(1), 164–177. https://doi.org/10.1016/j.jinteco.2013.04.007

Gelpern, A., Horn, S., Morris, S., Parks, B., & Trebesch, C. (2023). How China lends: A rare look into 100 debt contracts with foreign governments. *Economic Policy*, *38*(114), 345–416.

Gopinath, G., Gourinchas, P.-O., Presbitero, A. F., & Topalova, P. (2025). Changing global linkages: A new Cold War? *Journal of International Economics*, *153*, 104042.

Guiso, L., Sapienza, P., & Zingales, L. (2009). Cultural biases in economic exchange? *The Quarterly Journal of Economics*, *124*(3), 1095–1131.

Gutmann, J., Neuenkirch, M., & Neumeier, F. (2023). The economic effects of international sanctions: An event study. *Journal of Comparative Economics*, *51*(4), 1214–1231.

Hartig, F. (2013). Panda diplomacy: The cutest part of China's public diplomacy. *The Hague Journal of Diplomacy*, *8*(1), 49–78.

Heilmann, K. (2016). Does political conflict hurt trade? Evidence from consumer boycotts. *Journal of International Economics*, *99*, 179–191.

Horn, S., Reinhart, C. M., & Trebesch, C. (2021). China's overseas lending. *Journal of International Economics*, *133*, 103539.

IMF. (2025). International Trade in Goods (by partner country).

Isaksson, A.-S., & Kotsadam, A. (2018). Chinese aid and local corruption. *Journal of Public Economics*, *159*, 146–159.

Jackson, K., & Shepotylo, O. (2024). Political alliances and trade: Europe in a polarized world. *European Journal of Political Economy*, *85*, 102612.

Javorcik, B., Kitzmueller, L., Schweiger, H., & Yıldırım, M. A. (2024). Economic costs of friendshoring. *The World Economy*, *47*(7), 2871–2908.

Leira, H., & Neumann, I. B. (2017). Beastly diplomacy. *The Hague Journal of Diplomacy*, *12*(4), 337–359.

Li, B., Ge, Y., & Lin, Y.-m. (2024). Military alliance and international trade: Evidence from NATO enlargement. *The World Economy*, *47*(3), 930–956.

Lin, F., Hu, C., & Fuchs, A. (2019). How do firms respond to political tensions? The heterogeneity of the Dalai Lama effect on trade. *China Economic Review*, *54*, 73–93.

Liu, C., Ma, L., Liu, S., & Tang, S. (2024). Increasing or depressing: Animal diplomacy impacts on inbound tourism of host countries–a natural experiment based on panda diplomacy. *Journal of Hospitality and Tourism Management*, *61*, 338–349. https://doi.org/10.1016/j.jhtm.2024.12.004

Mansfield, E. D., Milner, H. V., & Rosendorff, B. P. (2000). Free to trade: Democracies, autocracies, and international trade. *American Political Science Review*, *94*(2), 305–321.

Menon, N. (2019). India's history of elephant diplomacy. *The Caravan*.

Michaels, G., & Zhi, X. (2010). Freedom fries. *American Economic Journal: Applied Economics*, *2*(3), 256–281.

Mohr, C., & Trebesch, C. (2025). Geoeconomics. *Annual Review of Economics*, *17*.

Morrow, J. D., Siverson, R. M., & Tabares, T. E. (1998). The political determinants of international trade: The major powers, 1907–1990. *American Political Science Review*, *92*(3), 649–661.

Nitsch, V. (2007). State visits and international trade. *World Economy*, *30*(12), 1797–1816.

O'Brien, S. J., Pan, W., & Lu, Z. (1994). Pandas, people and policy. *Nature*, *369*(6477), 179–180.

Okafor, L. E., Tan, C. M., & Khalid, U. (2021). Does panda diplomacy promote Chinese outbound tourism flows? *Journal of Hospitality and Tourism Management*, *49*, 54–64.

Pandya, S. S., & Venkatesan, R. (2016). French roast: Consumer response to international conflict-evidence from supermarket scanner data. *Review of Economics and Statistics*, *98*(1), 42–56.

Pollins, B. M. (1989). Does trade still follow the flag? *American Political Science Review*, *83*(2), 465–480.

Qian, J., Vreeland, J. R., & Zhao, J. (2023). The impact of China's AIIB on the World Bank. *International Organization*, *77*(1), 217–237.

Rauch, J. E. (1999). Networks versus markets in international trade. *Journal of International Economics*, *48*(1), 7–35.

Reuters. (2024). Giant panda habitat opens at California zoo to much fanfare [Accessed: 2024-12-30]. https://www.reuters.com/world/us/giant-panda-habitat-opens-california-zoo-much-fanfare-2024-08-08/

Rose, A. K. (2007). The foreign service and foreign trade: Embassies as export promotion. *World Economy*, *30*(1), 22–38.

Rose, A. K. (2019). Soft power and exports. *Review of International Economics*, *27*(5), 1573–1590. https://doi.org/10.1111/roie.12435

Santos Silva, J., & Tenreyro, S. (2006). The log of gravity. *Review of Economics and Statistics*, *88*(4), 641–658. https://doi.org/10.1162/rest.88.4.641

Schaller, G. B. (1994). *The last panda*. University of Chicago Press.

Smithsonian's National Zoo & Conservation Biology Institute. (2013). Her name is Bao Bao: Giant panda cub received her name during ceremony marking first 100 days [2013-12-02].

Songster, E. E. (2018). *Panda nation: The construction and conservation of China's modern icon*. Oxford University Press.

Stone, R. W., Wang, Y., & Yu, S. (2022). Chinese power and the state-owned enterprise. *International Organization*, *76*(1), 229–250.

The Economist. (2019). Why China rents out its pandas [2019-01-18].

The New York Times. (2023). They cuddled a kiwi. New Zealand said, “Stop that.” [2023-05-24].

The Washington Post. (2014). China, Malaysia, and the weird world of panda diplomacy [2014-05-21].

The Washington Post. (2015). National zoo’s giant panda cub is officially named Bei Bei [2015-09-15].

The Washington Post. (2023). The hidden power of China’s pandas — and why the U.S. is losing them all [2023-11-07].

UNCTAD. (2025). TRAINS Database [Accessed via WITS on July 16, 2025].

United Press International. (1984). Pandas ‘ready to meet the people of Los Angeles’ [1984-07-20].

Volpe Martincus, C., Estevadeordal, A., Gallo, A., & Luna, J. (2010). Information barriers, export promotion institutions, and the extensive margin of trade. *Review of World Economics*, *146*(1), 91–111.

World Bank. (2024). World Development Indicators.

WTO. (2025). WTO Regional Trade Agreements Database [Retrieved: April 26, 2025, from https://rtais.wto.org/UI/PublicMaintainRTAHome.aspx].

Appendix

Appendix A: Additional tables

Appendix A: Additional tables

Table A1: Summary statistics

	Obs	Mean	Std. Dev.	Min	Max
Exports to China (in millions)	4,708	5,359.65	21,636.59	0	323,250.53
Imports from China (in millions)	4,742	8,979.56	33,584.43	0	489,072.84
Panda	6,880	0.05	0.22	0	1
Panda Birth	6,880	0.01	0.09	0	1
Panda Leasing	6,880	0.00	0.07	0	1
GDP (in millions)	6,193	273,783.76	1,253,903.24	23.55	21,776,284.00
Population (in millions)	6,665	25.43	90.20	0.01	1,428.63
Exchange Rate	5,245	91.28	605.27	0.02	36,561.70
Regional Trade Agreement	6,665	0.06	0.24	0	1
Tariff rate (applied by China)	5,809	7.81	11.13	0	441.05
Tariff rate (applied by partner)	4,064	9.03	8.88	0	344.83
Other Exports to GDP	4,699	0.26	0.21	0.00	2.65
Other Imports to GDP	4,732	0.34	0.22	0.03	4.80
UN Ideal Point Distance	5,767	-0.88	0.79	-4.79	0

Notes: It reports the summary statistics of the variables used in the analysis. All monetary variables are expressed in real US$.

Table A2: Panda births and total exports to China, alternative measure

	Exports			
	(1)	(2)	(3)	(4)
Panda Birth nd	0.023	0.042*	0.032	0.061**
	(0.019)	(0.023)	(0.022)	(0.027)
Panda	0.026	0.016	0.052	0.026
	(0.090)	(0.087)	(0.078)	(0.069)
(log) GDP	0.770**	0.791*	0.390	-0.064
	(0.375)	(0.467)	(0.315)	(0.543)
(log) Population	0.804	0.380	2.268*	3.295**
	(1.066)	(1.158)	(1.159)	(1.627)
(log) Exchange Rate	-0.008	-0.126	-0.173	-0.526***
	(0.054)	(0.144)	(0.164)	(0.195)
Regional Trade Agreement	0.059	0.143	-0.019	-0.096
	(0.115)	(0.140)	(0.124)	(0.122)
(log) Tariff	-0.133**	-0.092	0.008	0.016
	(0.067)	(0.068)	(0.081)	(0.068)
Other Exports to GDP	1.055***	0.863**	1.009**	1.045**
	(0.405)	(0.419)	(0.418)	(0.432)
Observations	3,538	2,726	512	360
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the real amount of partner countries' exports to China in US$. The independent variable of interest, *Panda Birth nd*, is a dummy equal to 1 if in year t in country c a giant panda is born. Differently from all other tables, the births occurred in November and December of year *t-1* are not shifted to year *t*. Control variables, fixed effects, and subsamples are defined as in Table 3.3. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Table A3: Panda births, female pandas, and total exports to China

	Exports			
	(1)	(2)	(3)	(4)
Panda Birth	0.042**	0.063***	0.054*	0.083***
	(0.019)	(0.019)	(0.028)	(0.028)
Female Panda	-0.096**	-0.125*	-0.099***	-0.094
	(0.041)	(0.072)	(0.038)	(0.069)
(log) GDP	0.733*	0.748*	0.313	-0.153
	(0.376)	(0.427)	(0.274)	(0.442)
(log) Population	0.845	0.272	2.949**	3.619**
	(1.084)	(1.136)	(1.224)	(1.608)
(log) Exchange Rate	-0.003	-0.125	-0.169	-0.539**
	(0.056)	(0.143)	(0.167)	(0.216)
Regional Trade Agreement	0.027	0.124	-0.103	-0.139
	(0.112)	(0.135)	(0.130)	(0.134)
(log) Tariff	-0.152**	-0.116*	-0.012	-0.004
	(0.071)	(0.068)	(0.088)	(0.069)
Other Exports to GDP	0.922**	0.701*	0.973**	0.969**
	(0.383)	(0.403)	(0.396)	(0.411)
Observations	3,538	2,726	512	360
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the real amount of partner countries' exports to China in US$. The independent variable of interest, *Panda Birth*, is equal to 1 if a giant panda is born in country c in year t. The variable *Female Panda* is the number of female panda that country c has in year t. All other control variables are defined as in Table 3.3. All columns include country and year fixed effects. Columns 1 and 3 refer to the period 1994-2019, while columns 2 and 4 to the period 2002-2019. Columns 3 and 4 include only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Table A4: Panda births and exports to Suriname

	Exports			
	(1)	(2)	(3)	(4)
Panda Birth	-0.018	-0.001	0.007	0.053
	(0.056)	(0.047)	(0.050)	(0.041)
Panda	0.059	0.082	0.081	0.040
	(0.106)	(0.087)	(0.102)	(0.082)
(log) GDP	0.857***	1.477***	0.940*	1.104**
	(0.297)	(0.371)	(0.500)	(0.430)
(log) Population	0.995	0.886	-1.262	1.896**
	(1.149)	(1.398)	(0.776)	(0.869)
(log) Exchange Rate	-0.019	0.435**	-0.018	0.168
	(0.046)	(0.213)	(0.055)	(0.164)
Regional Trade Agreement	0.010	0.007	-0.095	-0.015
	(0.106)	(0.103)	(0.074)	(0.060)
Other Exports to GDP	2.092***	1.897***	0.824**	0.459
	(0.515)	(0.385)	(0.389)	(0.400)
Observations	3,157	2,330	516	360
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the real amount of partner countries' exports to Suriname in US$. The independent variable of interest, *Panda Birth*, is a dummy equal to 1 if in year t in country c a giant panda is born. Control variables are: *Panda*, that is a dummy equal to 1 if in year t country c has a giant panda, *log(GDP)* that is the logarithm of real GDP in US$ of the partner country, *log(Population)* which is the logarithm of partner country population, *log(Exchange rate)* that is the logarithm of the real exchange rate between partner country LCU and Suriname dollar, *Regional Trade Agreement* that is a dummy equals 1 if Suriname has a regional trade agreement in force at least at the end of June of year t with the partner country, and *Other exports to GDP* denotes the total amount of exports of the partner country towards territories different from Suriname over its GDP. All columns include country and year fixed effects. Columns 1 and 3 refer to the period 1994-2019, while columns 2 and 4 to the period 2002-2019. Columns 3 and 4 include only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Panda birth and exports by sector to China

	Exports by sector			
	(1)	(2)	(3)	(4)
Panda Birth	0.031*	0.049**	0.027	0.048**
	(0.016)	(0.020)	(0.019)	(0.019)
Panda	-0.029	-0.033	0.011	-0.007
	(0.056)	(0.060)	(0.043)	(0.042)
(log) GDP	0.782**	0.795**	0.660**	0.502
	(0.314)	(0.392)	(0.280)	(0.330)
(log) Population	0.049	-0.170	0.652	1.100
	(1.022)	(1.209)	(0.655)	(0.873)
(log) Exchange Rate	0.006	-0.049	-0.054	-0.213
	(0.035)	(0.105)	(0.101)	(0.139)
Regional Trade Agreement	0.037	0.067	0.063	0.025
	(0.064)	(0.066)	(0.067)	(0.066)
(log) Tariff	-0.062**	-0.054**	0.055*	0.057*
	(0.026)	(0.027)	(0.031)	(0.029)
Other Sector Exports to GDP	1.762	1.662	1.210*	1.381**
	(1.323)	(1.421)	(0.629)	(0.655)
Observations	268,999	201,718	49,586	34,848
Country-industry FE	Yes	Yes	Yes	Yes
Year-industry FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

Notes: Panel with country-industry as observation units and PPML estimates. The dependent variable is the real amount of partner countries' exports to China in US$ for each industry. The independent variable of interest, *Panda Birth*, is a dummy equal to 1 if in year t in country c a giant panda is born. Control variables are: *Panda*, that is a dummy equal to 1 if in year t country c has a giant panda, *log(GDP)*, that is the logarithm of real GDP in US$ of the partner country, *log(Population)* which is the logarithm of partner country population, *log(Exchange rate)* that is the logarithm of the real exchange rate between partner country LCU and Yuan, and *Other sector exports to GDP* denotes the total amount of exports in a specific sector of the partner country towards territories different from China over its GDP. All columns include country-industry and year-industry fixed effects. Columns 1 and 3 refer to the period 1994-2019, while columns 2 and 4 to the period 2002-2019. Columns 3 and 4 include only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Table A6: Births and exports by sector to China in politically aligned vs non-aligned countries

	Exports by sector	
	(1)	(2)
Panda Birth × Not Aligned	0.050**	0.052***
	(0.022)	(0.019)
Panda Birth × Aligned	-0.013	0.025
	(0.032)	(0.030)
Panda	-0.013	-0.004
	(0.062)	(0.044)
(log) GDP	0.861**	0.464
	(0.385)	(0.326)
(log) Population	-0.217	1.511
	(1.095)	(1.072)
(log) Exchange Rate	-0.054	-0.276*
	(0.107)	(0.152)
Regional Trade Agreement	0.057	-0.015
	(0.068)	(0.079)
(log) Tariff	-0.066**	0.034
	(0.027)	(0.026)
Other Exports to GDP	0.643*	0.647***
	(0.362)	(0.247)
Observations	197,475	34,848
Country-industry FE	Yes	Yes
Year-industry FE	Yes	Yes
Starting year	2002	2002
Only countries in panda diplomacy		Yes

Notes: Panel with country-industry as observation units and PPML estimates. The dependent variable is the real amount of partner countries' exports to China in US$. The independent variable of interests are the interaction between the variable *Panda Birth*, which is a dummy equal to 1 if in year t in country c a giant panda is born and the variables: *Not Aligned*, which is a dummy equal to 1 if country c belongs to the group of Chinese non-politically aligned countries, and *Aligned*, which is a dummy equal to 1 if country c belongs to the group of Chinese politically aligned countries. See notes to Table 3.3 for control variables specification. All columns include country-industry and year-industry fixed effects and refer to the period 2002-2019. Column 2 includes only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Table A7: Panda births and total exports to China, nominal values

	Nominal Exports			
	(1)	(2)	(3)	(4)
Panda Birth	0.054***	0.064***	0.050**	0.057**
	(0.017)	(0.019)	(0.020)	(0.025)
Panda	0.020	0.016	0.043	0.026
	(0.086)	(0.084)	(0.070)	(0.059)
(log) Nominal GDP	0.598***	0.651***	0.464***	0.561***
	(0.137)	(0.161)	(0.140)	(0.171)
(log) Population	0.566	0.303	2.062**	2.273**
	(0.953)	(1.038)	(1.029)	(1.156)
(log) Nominal Exchange Rate	0.062	0.104	0.083	0.358**
	(0.040)	(0.106)	(0.074)	(0.174)
Regional Trade Agreement	0.101	0.151	-0.039	-0.073
	(0.111)	(0.131)	(0.102)	(0.084)
(log) Tariff	-0.069	-0.045	0.058	0.086
	(0.057)	(0.058)	(0.064)	(0.063)
Other Exports to GDP	1.087***	0.938**	1.027**	0.869**
	(0.408)	(0.413)	(0.434)	(0.432)
Observations	3,766	2,881	512	360
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Starting year	1994	2002	1994	2002
Only countries in panda diplomacy			Yes	Yes

Notes: Panel with countries as observation units and PPML estimates. The dependent variable is the nominal amount of partner countries' exports to China in US$. The independent variable of interest, *Panda Birth*, is a dummy equal to 1 if in year t in country c a giant panda is born. Control variables are: *Panda*, that is a dummy equal to 1 if in year t country c has a giant panda, *log(GDP)* that is the logarithm of nominal GDP in US$ of the partner country, *log(Population)* which is the logarithm of partner country population, *log(Exchange rate)* that is the logarithm of the nominal exchange rate between partner country LCU and Yuan, *Regional Trade Agreement* that is a dummy equals 1 if China has a regional trade agreement in force at least at the end of June of year t with the partner country, *log(Tariff)* that is the logarithm of exports tariff (plus 1), and *Other exports to GDP* denotes the total amount of exports of the partner country towards territories different from China over its GDP. All columns include country and year fixed effects. Columns 1 and 3 refer to the period 1994-2019, while columns 2 and 4 to the period 2002-2019. Columns 3 and 4 include only countries with at least one panda in the sample period. Standard errors (in parenthesis) are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1

Table A8: Definition and sources

Variable	Description	Source	Unit
Dependent variables			
Exports	Exports to China in given year from partner country scaled by CPI (base year = 2010)	Own elaboration from UN Comtrade and WDI	US dollars
Imports	Imports from China in given year from partner country scaled by CPI (base year = 2010)	Own elaboration from UN Comtrade and WDI	Constant US dollars
Panda variables			
Panda	Dummy = 1 if partner country has at least a giant panda for some day during the year	Own elaboration from news and zoos websites	Binary
Panda Birth	Dummy = 1 if a panda cub is born in the partner country in November–December of the previous year or between January and October of the current year	Own elaboration from news and zoos websites	Binary
Panda Leasing	Dummy = 1 if China leased a giant panda to a partner country during the year	Own elaboration from news and zoos websites	Binary
Female Panda	Number of female pandas present in a country in the year	Own elaboration from news and zoos websites	Unit
Control variables			
(log) GDP	Logarithm of real gross domestic product of partner country	Own elaboration from World Development Indicators	Constant US dollars
(log) Population	Logarithm of population of partner country	Own elaboration from World Development Indicators	Unit
(log) Exchange Rate	Logarithm of real exchange rate (local currency unit per Yuan), which is calculated as the ratio of the exchange rate LCU per US dollars and the exchange rate US dollars per Yuan, multiplied by the ratio between Chinese CPI and partner country CPI	Own elaboration from World Development Indicators	Unit
Regional Trade Agreement	Dummy = 1 if China has a regional trade agreement in force with the partner country at least at the end of June of the year	Own elaboration from WTO	Binary
(log) Tariff	Logarithm of trade-weighted bilateral tariff on imports	Own elaboration from UNCTAD TRAINS (via WITS)	%
Other Exports to GDP	Total exports to all countries except China (as a share of GDP)	Own elaboration from UN Comtrade and WDI	% of GDP
Other Imports to GDP	Total imports to all countries except China (as a share of GDP)	Own elaboration from UN Comtrade and WDI	% of GDP
Other control variables			
Non aligned	Dummy = 1 if a panda diplomacy country is politically non-aligned with China, based on UN ideal point distance	Own elaboration from Bailey et al., 2017	Binary
Aligned	Dummy = 1 if a panda diplomacy country is politically aligned with China, based on UN ideal point distance	Own elaboration from Bailey et al., 2017	Binary
UN Ideal Point Distance	Absolute negative difference in ideal points based on UN General Assembly voting between each country and China	Bailey et al., 2017	Unit
(log) Nominal GDP	Logarithm of nominal gross domestic product of partner country	Own elaboration from World Development Indicators	Current US dollars
(log) Nominal Exchange Rate	Logarithm of exchange rate (local currency unit per Yuan), which is calculated as the ratio of the exchange rate LCU per US dollars and the exchange rate US dollars per Yuan	Own elaboration from World Development Indicators	Unit
Other Sector Exports to GDP	Total exports in a given sector to all countries except China (as a share of GDP)	Own elaboration from UN Comtrade and WDI	% of GDP