Economic ties and aid allocation

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PRELIMINARY VERSION PLEASE DO NOT QUOTE

Abstract: This paper leverages granular data on subnational economic ties between 18 main European donor countries and African administrative regions to test a gravity model of aid flows. Using dyadic data at the donor country - ADM2 region level, we examine whether European aid is disproportionately allocated to ADM2 regions with stronger economic ties to the donor, proxied by Orbis firm ownership data. Controlling for need-based indicators and various fixed effects, we find that, on average, an additional ownership link in an ADM2 region corresponds to a 5.7% increase in aid allocation. The effect is robust when using a shift-share IV, where we instrument the number of affiliates in an aid-recipient region with a variable capturing the impact of credit availability on parent firms. We also explore donor-specific effects and sectoral heterogeneity, highlighting the critical influence of donor economic interests on development finance allocation.

Keywords: Aid allocation, European ODA projects, Geocoding, Firm Ownership

JEL classification: F35, D73, R10.

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1 Introduction

The European Union (EU) and its member states provide more than half of global development aid, and they have long favored connections with countries in Africa, among its clientele for development assistance.[1] As a continent, Africa has consistently been the top recipient of European Union Official Development Assistance (ODA) since the creation of the EU, with an average of 18 billion in ODA disbursements from the EU over the past 20 years (OECD, 2024).[2] The large amount of development assistance coming from the EU and its member states will play a central role as these two continents converge in the coming years on interests in several areas, from climate change, to the promotion of job creation and economic growth in Africa.[3]

The magnitude of these flows provides scope for questions on their allocative distribution and their effectiveness. As documented by Horn et al. (2020) official lending is much larger than commonly known, often surpassing total private cross-border capital flows, especially in times of global turmoil when private flows generally shrink. Importantly, these alternative flows are determined by factors other than mere financial returns, and the question on the role of these other factors (be they economically or politically strategic) is relevant. Exploiting a newly geocoded dataset of European aid projects, Bomprezzi et al. (2024) have shown that subnational distortions in aid allocation exist for European donors as well as the US and China. This paper focuses on European aid allocation in Africa, given the new evidence on the important linkages between the two continents.

The literature has shown the role that donor-specific characteristics have in bilateral aid allocation patterns (Alesina and Dollar, 2000; Dreher et al., 2019; Bomprezzi et al., 2024). In this paper, we evaluate the role of sub-national economic determinants of European bilateral aid projects. Specifically, we analyze the role of economic ties as a driver of aid

[1] Generally the EU's focus has been on boosting the effectiveness of development assistance by increasing partner country ownership of strategies, and combining traditional financing with private-sector and domestic resources (OECD, 2005). Current priorities for the coming years include further investments in research and innovation, climate change; health, education, sustainable growth, and security.

[2] In 2022 US $. This corresponds to at least 50% more in ODA disbursements than other eligible continents, which consist of Europe, Asia, Oceania, and the Americas, and where Asia includes the Middle East. These patterns are set to continue, as the EU extends its interest in Africa beyond traditional development goals.

[3] The EU has outlined a road map to serve as the basis for negotiations on a specific new partnership as part of the joint Africa-EU partnership (EuropeanCommission, 2020).

flows. We use a granular, geocoded, dataset of aid projects and firm locations to test a gravity-like model, where European aid flows 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 European project aid is taken from GODAD, the database of geocoded official development assistance based on the OECD Creditor Reporting System project data which is compiled by Bomprezzi et al. (2024). To construct our measures of subnational economic ties, we use firm ownership data from Orbis to calculate the number and degree of ownership linkages between firms in European donor countries and firms in African, aid-recipient, ADM2 regions. Together, we leverage 62,116 ownership links in 48 countries and 515 ADM2 regions between 2000 and 2019 to explain the allocation of subnational aid.

We aim to identify the within-pair effect of an increase in economic ties on aid flows. Our identification strategy relies on a comprehensive set of control variables to account for observable heterogeneity, donor-recipient region fixed effects to address unobservable heterogeneity, and donor-year as well as recipient-year fixed effects to control for time-specific factors at the donor and recipient levels. The remaining sources of endogeneity that may bias our results include time varying, pair-level, omitted variables and reverse causality. This paper specifically examines the role of subnational economic determinants in shaping aid flows, introducing a novel channel based on direct measures of economic ties, namely firm linkages. To the best of our knowledge, this is the first study to systematically assess the role of economic ties in subnational aid allocation.[4]

Our main results indicate that ownership links in an ADM2 region are positively associated with aid. We find that, on average, an increase by one ownership link in an ADM2 region determine a 5.7% increase in aid. We find similar results when focusing on ADM1 regions, despite the coefficients are in absolute term smaller. Furthermore, we show that the aid sectors which drive our results are the economic and social ones (those that are more generously funded), while, all firm sectors seem to be positively and significantly associated with aid. Our results are also robust to a series of alternative specifications, including differing measures of aid.

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

In the last part of the paper, we provide some evidence on the behavior of the largest individual donors: France, Germany, Italy, the Netherlands, the group of Nordic countries (Denmark, Finland, Norway and Sweden), Spain and the United Kingdom. This donor heterogeneity is relevant, as varying effects between different European donors points to a differential importance in the economic links between donor and recipient country firms. Our analysis reveals that all donors excluding Italy and the Netherlands divert higher aid commitments to African region in which there are owners with their nationality. This effect persists even when controlling for within-country and within-first-level administrative region variations. Thus, besides donor political motivations (Alesina and Dollar, 2000; Dreher et al., 2019; Bomprezzi et al., 2024), we find some evidence that bilateral European aid is also vulnerable to "economic capture".[5]

This paper relates to two main streams of the literature. First and foremost, the vast literature on aid allocation. There is some empirical evidence linking a country's geopolitical proximity to DAC donors with a variety of types of preferential treatment (Alesina and Dollar, 2000; Faye and Niehaus, 2012; Kuziemko and Werker, 2006; Kilby, 2009).[6] What is more, donors have also been criticized for a lack of "ownership" and underutilizing local knowledge in recipient countries Dreher et al. (2017).[7]

Most of this literature, in fact, focuses on the political dimensions driving aid allocation. Regarding economic determinants, some early papers documented a positive relationship between aid and trade at the national level (Wagner, 2003; Silva and Nelson, 2012). Such link is, at least to some extent, explained by tied aid, which consists in goods and services that the donor outright supplies.[8] Since tied aid may represent a big business in donor countries, it might be disbursed considering the incentives of the donors' companies rather than the recipients' needs (Jepma, 1991; Morrissey, 1993; Knack and Smets, 2013; Ganga, 2024). More recently, Chauvet and Wagner (2018) examined the link between aid

[5]To the extent that larger economic ties characterize richer areas, our results are in line with Briggs (2017, 2018a,b), who shows that aid flows to richer rather than poorer cells.

[6]In turn, when aid allocation is driven by political influence aid is likely to be effective (Dreher et al., 2018, 2013; Kilby, 2015).

[7]For example, quite a few papers have argued that institutions, organizations, and policies are context-specific and that, for their successful implementation, conditional programs should suit better recipient countries' specific needs (Basurto et al., 2020; Marchesi and Masi, 2021).

[8]More specifically, recipients of tied aid must use the money to buy goods (e.g., medical devices) or services (e.g., consultants) from companies in the donor country.

and European bilateral donor affiliates' sales in developing countries. They document a large rate of return of bilateral aid to donor country affiliates' performance. This result questions the practice among bilateral donors of using public procurements to favor their economic interests through their use of informal tied aid. The paper most closely related to ours is Sonno (2024), as it similarly explores the economic impacts of foreign corporate activity in Africa, focusing on the links between corporate behavior and local conflict.[9] We contribute to this literature by demonstrating that economic ties also play a significant role in shaping sub-national aid allocation.

Our paper also relates to an emerging strand of literature on sub-national aid. Quite a few papers have explored sub-national aid effectiveness (Dreher and Lohmann, 2015; Bluhm and Krause, 2018; Cruzatti C. et al., 2023; Isaksson and Kotsadam, 2018; Gehring et al., 2022; Dreher et al., 2021; Marchesi et al., 2024). On the other hand, other contributions have focused on sub-national aid determinants (Briggs, 2018a,b, 2021; Dreher et al., 2019; Anaxagorou et al., 2020; Bomprezzi et al., 2024).[10] We contribute to this literature by constructing granular data on subnational economic ties between major European donors and African administrative regions. In summary, this paper advances the existing literature on aid by utilizing this new data to propose a mechanism of economic favoritism in the aid allocation process, driven by firm ownership linkages.

We organize the rest of the paper as follows. Section 2 describes the data. Section 3 outlines the baseline model. Section 4 shows our results for total aid, and separately by donors. Section 5 addresses endogeneity concerns using an instrumental variables (IV) approach and Section 6 presents robustness checks. Finally, Section 7 concludes the paper.

2 Data

We combine data on firm ownership provided by Orbis with data on European ODA projects from the *Geocoded Official Development Assistance Dataset* (GODAD) (Bom-

[9] More generally, the relationship between globalization and economic development in Africa is complex, as foreign direct investment (FDI) can yield both positive and negative outcomes (Amighini and Sanfilippo, 2014; Coniglio et al., 2015).

[10] While most of these authors have focused on sub-national (Chinese aid) determinants in Africa, Bomprezzi et al. (2024) take a broader perspective by looking at all donors for which geocoded aid projects are currently available.

prezzi et al., 2024) covering the years 2000-2019. Our focus is on African firms based in any of 18 European donor countries.[11] To achieve this, we construct a dyadic dataset capturing firm ownership ties between firms based in European 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. Next, we provide a brief overview of the European aid data from GODAD, which serves as our primary outcome variable, followed by a description of the subnational controls used in our analysis.

2.1 Firm Ownership

To proxy for subnational economic links between the donor country and the recipient region, we construct a donor-recipient region-year measure of ownership ties. Specifically, we rely on Orbis (Bureau van Dijk, 2024) firm ownership data to identify the number of firms located in African ADM2 regions and owned by European shareholders. The Orbis database provides detailed financial and ownership information for both private and publicly listed firms. Data are directly collected from government and commercial information providers, with balance sheet details sourced from national business registers.

Several papers provide methodological guidance on the usage and limitations of Orbis. Kalemli-Özcan et al. (2024) is often cited as a reference point, as it outlines best practices for sampling both financial and ownership data from Orbis.[12] However, some caveats are 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. If the inclusion of data in a business registry or statistical office is subject to a threshold, smaller firms may be excluded. For our analysis, we focus on ownership links, which serve as proxies for meaningful economic ties. Consequently, the presence of many small firms with spurious ownership links from European firms would introduce noise into the estimates.

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

[12] Additional works providing methodological insights into Orbis include Schild (2016).

Orbis ownership data has become increasingly popular among researchers working with firm-level outcomes. For example, Rosati et al. (2024) propose a unified statistical methodology that utilizes Orbis ownership data to create industry-specific indicators of market concentration, supporting their findings with an empirical exercise. Similarly, Turk-Ariss et al. (2022) use changes in foreign ownership of firms within IMF-program countries as a proxy for firms' sensitivity to the policy environment. Kalemli-Özcan et al. (2022) use information from Orbis on firm's banking relationships to quantify the role of financial leverage in the performance of European firms. Following this literature, we use Orbis ownership data as a proxy for economic ties between donor-country firms and those in aid-recipient countries.[13]

A key advantage of Orbis lies in its global coverage and the availability of standardized, comparable firm-level data across a large sample of countries. Additionally, Orbis includes qualitative information about firms, such as industry classifications and legal details, which we utilize to extract geographic information on firms. Importantly for us, this global coverage extends to the ownership network of firms, including those that span international borders, making it widely regarded as the premier data source for analyzing cross-border ownership connections (Rosati et al., 2020). This feature is instrumental in constructing our measure of subnational economic links between donor and recipient regions.

Ownership data includes the names of shareholders, their total and direct shareholdings in the company, their country of origin, and other balance sheet information available for each firm registered in Orbis. For our analysis, we focus on the total share of ownership and the country of origin of the shareholding firm. This information is used to identify and measure the links between donors and firms in recipient regions.[14] Specifically, we define a link as any African firm in our sample with, in its ownership structure, a firm from one of our 18 European donor countries holding at least a 10% interest. This threshold aligns with the numerical guidelines adopted by the OECD for measuring and tracking cross-border direct investment flows. An ownership stake of 10% indicates a direct investment

[13]For additional examples of studies using Orbis data, see Altomonte and Nicolini (2012) and Bravo-Biosca et al. (2016).

[14]We prefer to use total ownership links to net out the numerous intermediate ownership ties between a donor and recipient region firm. As a robustness check, we also consider the number of direct links as the independent variable of interest.

relationship, suggesting that the investor has the ability to influence the management of the enterprise (OECD, 2024). Using this threshold, we construct a measure of economic ties between donors and recipient regions, treating ownership links as a suitable proxy for subnational economic connections.[15]

We extract firm-level data in the following way. First, we query Orbis on a year-by-year basis to select all companies, regardless of their status in that particular year. Since our primary focus is on cross-sectional variation, this approach allows us to consider firms that may drop out of the sample over time, but whose presence at any point could influence the economic interests of the donor in the region. From the full set of firms, we filter for those operating in Africa, resulting in over 22 million firms. Next, we select only those African firms with at least one foreign shareholder from a donor country who holds at least 10% ownership in the firm for any given year within the sample period. Finally, to avoid double counting, we exclude firms that have a consolidated account with an unconsolidated companion (C2 type of firm in Orbis), and marine vessels, bringing the final sample to 31,519 distinct firms located in the 54 African countries.

The extracted sample contains the ownership history of African firms with European shareholders that meet our query criteria. Ownership links are recorded at the firm-year level and derived from national firm registries or third-party data collection by Orbis. However, Orbis historical series on ownership may sometimes be incomplete if the original data source does not capture changes in ownership. Consequently, missing values in the ownership series may reflect either unreported data or a static ownership structure over time.

To mitigate issues arising from missing data, we perform linear interpolation on the firm-owner ownership data. The interpolation starts from the first observed ownership value and continues until the last observed ownership value. Around 21% (17,089) of the ownership observations for a firm-owner-year triad are imputed. Of these, only 5,685 are imputed for one year and the vast majority of such single-year imputations (4,577) are constant, meaning that the observed ownership values did not deviate from one year to the next. Given the low probability of a hypothetical ownership change followed by re-

[15]In this paper, we abstract from interpreting ownership links as governance channels, which may vary across sectors, countries, or degrees of ownership.

version to the original value in a single year, we argue that our interpolation does not introduce significant noise and represents a valid solution to missing data. Similarly, of the remaining 11,404 triads, the majority of them had a similar constant imputation. Since the interpolation ends in the year when we observe the last ownership value for each firm, missing values in later years of the time series could indicate that the firm no longer has the same owner or face the same data reporting issues. To address these problems, we extend the sample up to 2024, leveraging additional years to complete the interpolation. However, it is not possible to complete the ownership data series for every firm up to 2019.

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 firms location, which we then aggregate to the ADM2 region level. By combining these geographic details into a single variable for each firm, we can account for differences in reporting standards across countries.[16] To further refine the geocoding process, we use the Google API to obtain coordinates for each firm based on the address data. After aggregating this information to the ADM2 level, we overcome challenges related to missing or imprecise geocoding. We are able to geocode 22,068 firms (70% of the total) in 48 countries.[17]

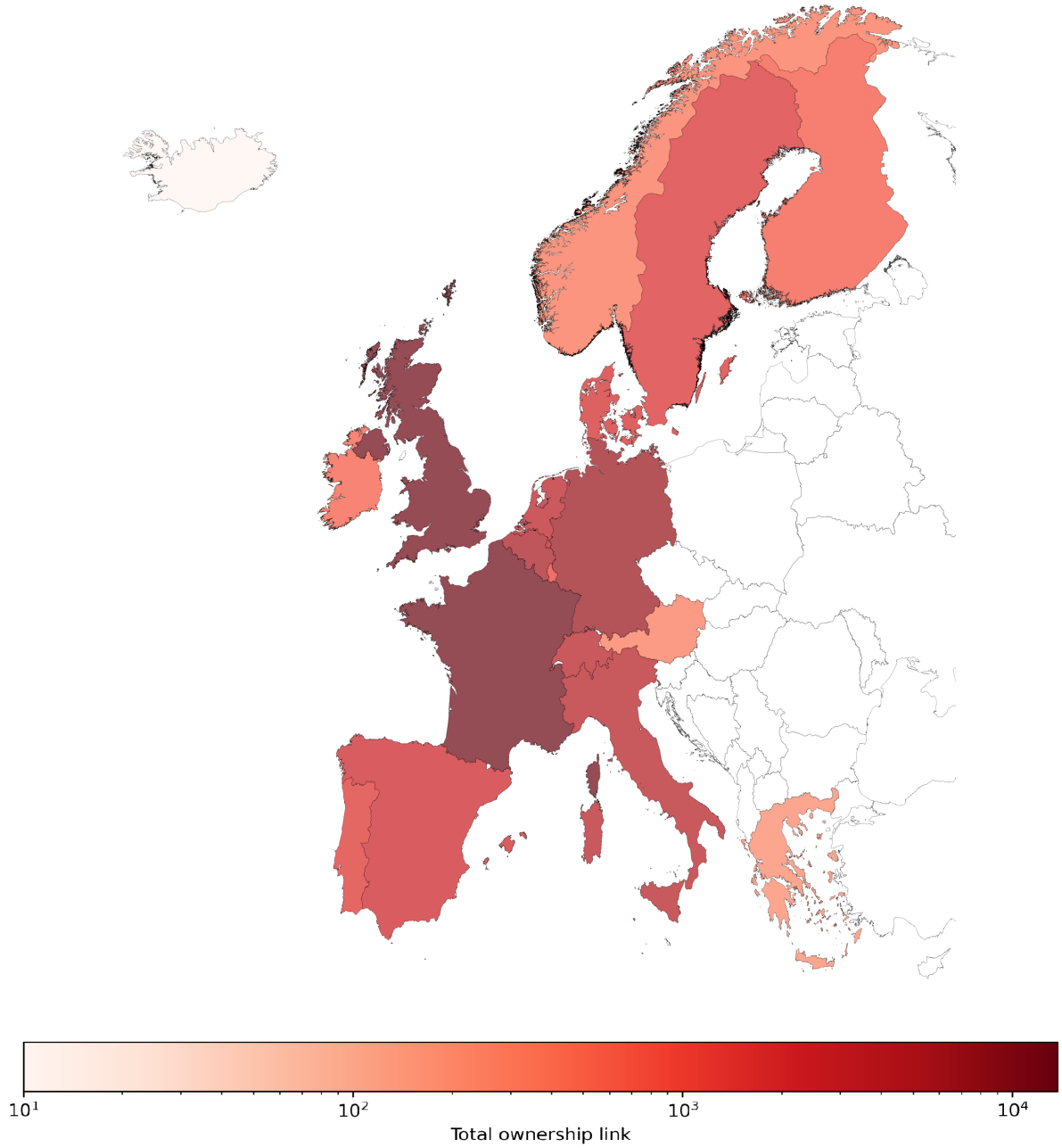
Finally, we count the number of African firms owned by companies from each European donor in our sample, located in each African ADM2 region. Figure 1 shows the number of ownership links from European countries to African firms, summed annually across the entire study period. The red shading in the figure indicates the number of firms, whereas the white areas represent countries excluded from our sample. The three main European countries with the highest ownership links in Africa are France, the United Kingdom, and Germany, with 13,744, 13,287, and 7,074 ownership links, respectively.[18]

[16]For example, the city variable in Egypt may only provide information at the ADM1 region level, but when combined with data from other address variables (such as street and postal code), we can pinpoint the firm's precise coordinates. In contrast, the city variable in South Africa includes detailed information that directly identifies the firm's location, making additional address variables unnecessary. This method increases the likelihood of successfully geocoding firms, as we can combine different available pieces of information.

[17]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.

[18]The total ownership links for the other donor countries in our sample are as follows: Austria (318),

Figure 1: Number of African firms owned by companies from each European country



Notes: The map shows the number of African firms owned by companies from European countries. Colored areas represent the donor countries included in our sample, while white areas denote countries that are not part of the sample.

We also explore firm-level heterogeneity to examine how the effects may vary. From the firm perspective, we use the primary NACE sectors reported by Orbis.[19] Table A.1 presents the number of total links between European donor country-based firms and firms in recipient regions, segmented by sector. The highest number of links is found in the manufacturing sector, which is one of the largest sectors represented in Orbis. The agricultural and energy sectors exhibit fewer links, which aligns with expectations: energy firms are fewer in number, and agricultural firms tend to be smaller and more locally owned.

Limitations in Orbis firm data can arise due to coverage issues. For example, countries where financial information filing is mandatory tend to have more comprehensive data in the Orbis sample. In our analysis coverage varies by aid recipient country, as displayed in Table A.1 in the Appendix. As shown, the top three countries in terms of ownership links with European donor countries are South Africa, Morocco, and Egypt, with 22,970, 7,449, and 3,229 ownership links, respectively. Among our sample of aid recipient countries, only a few lack sufficient information on ownership links with European firms.[20]

2.2 European Aid

Our data on subnational European aid is sourced from the *Geocoded Official Development Assistance Dataset (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 Creditor Reporting System (CRS): 18 European countries and the United States. The data is geocoded using project descriptions and titles as reported in the OECD Creditor Reporting System (CRS), which are processed through a Natural Language Processing

Belgium (5,424), Denmark (1,926), Finland (708), Greece (221), Iceland (10), Ireland (614), Italy (4,137), Luxembourg (1,087), the Netherlands (3,756), Norway (388), Portugal (1,545), Spain (2,280), Sweden (1,658), and Switzerland (3,939).

[19] Firms' sectors are categorized as follows: agriculture, communication, construction, energy, manufacturing, mining, retail, and other. Sectors are defined according to NACE Sections, apart for the energy sector which includes both "Electricity, gas, steam and air conditioning supply" and "Water supply; sewerage; waste management and remediation activities," the retail sector that includes both "Wholesale and retail trade; repair of motor vehicles and motorcycles" and "Accommodation and food service activities," and the communication sector which includes both "Transporting and storage" and "Information and communication." The "other sector" includes all remaining NACE Sections not mentioned above.

[20] These countries include Eritrea, the Guineas, Gambia, and Somalia. The results are robust to the exclusion of these countries.

(NLP) pipeline to identify geographic entities within the recipient country.[21] 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 2000 to 2019, to match the coverage of our firm ownership data.

Figure 2 shows the value of ODA commitments in million of US$ received by the African ADM2 regions from European countries. 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, Mozambique, and the Democratic Republic of Congo, which received 4,760, 2,490 and 2,480 million US$, respectively. At a more granular level, the top three ADM2 recipient regions are all located in Morocco with each receiving over 700 million US$. On average, ODA commitments amount to about 1.3 million US$ per African ADM2 region in our sample, although there is considerable variance, with the largest flows nearing 1 billion US$.[22]

We also examine the heterogeneity of aid across sectors. Figure A.2 in the Appendix 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 "Social Infrastructure," which includes projects in health, education, governance, and sanitation. The second-largest category is "Economic," covering infrastructure projects related to transportation, energy, and communication.[23]

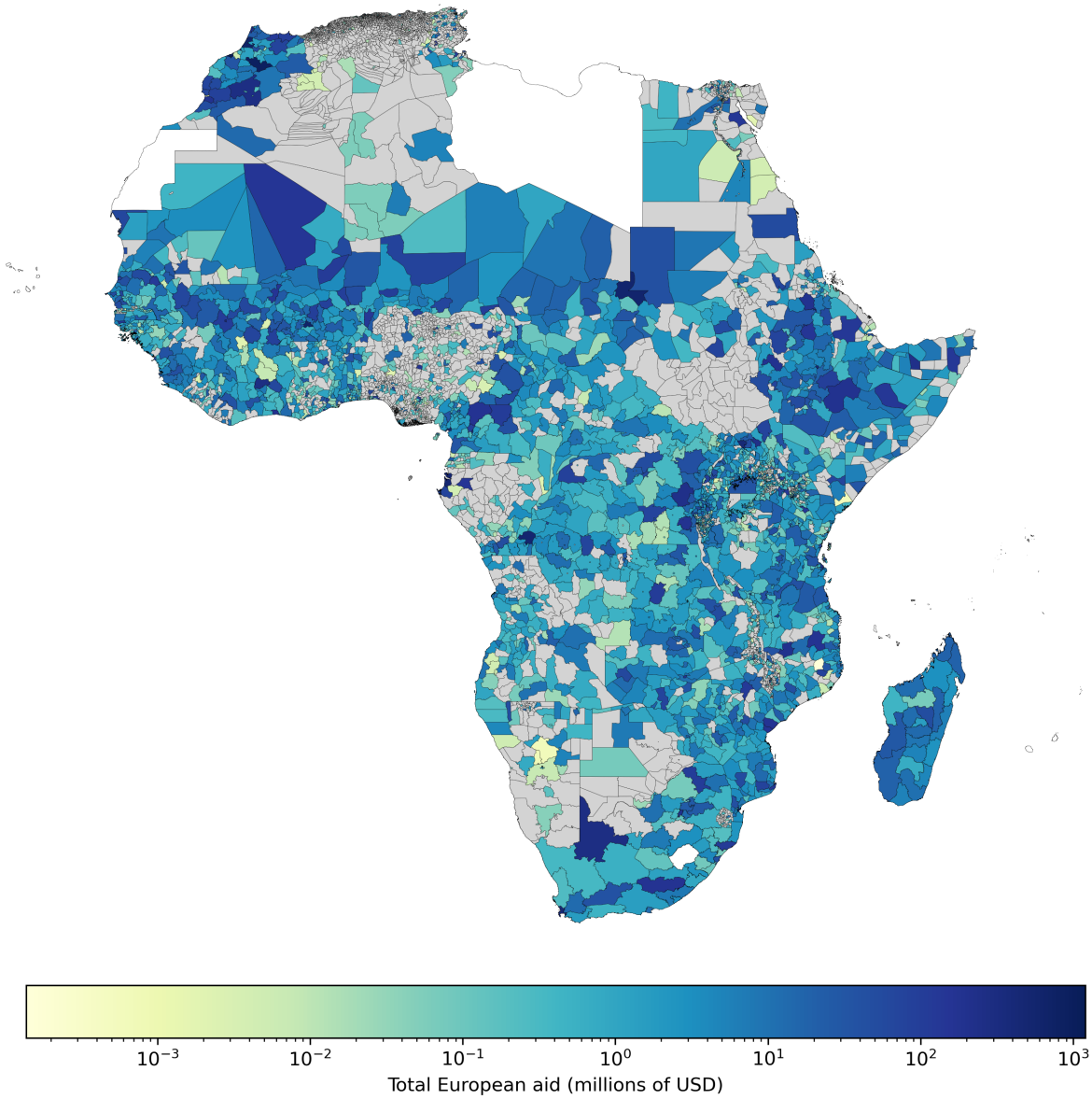
To demonstrate the interaction between ownership links and aid in our data, Figure 3 shows the overlap between aid and ownership links for a donor-recipient country sample. In particular, the figure illustrates the total number of Spanish ownership links (represented by red arrows) and total aid commitments (depicted in blue regions) within

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

[22] The largest registered commitments are recorded in Morocco and Egypt, in 2018 and 2012, amounting to 800 and 400 million US$ respectively.

[23] "Production" sector projects are industry-specific, including those in fishing, forestry, mining, industry, trade, and tourism. "Emergency" refers to humanitarian and emergency aid projects.

Figure 2: Total commitments in African ADM2 regions

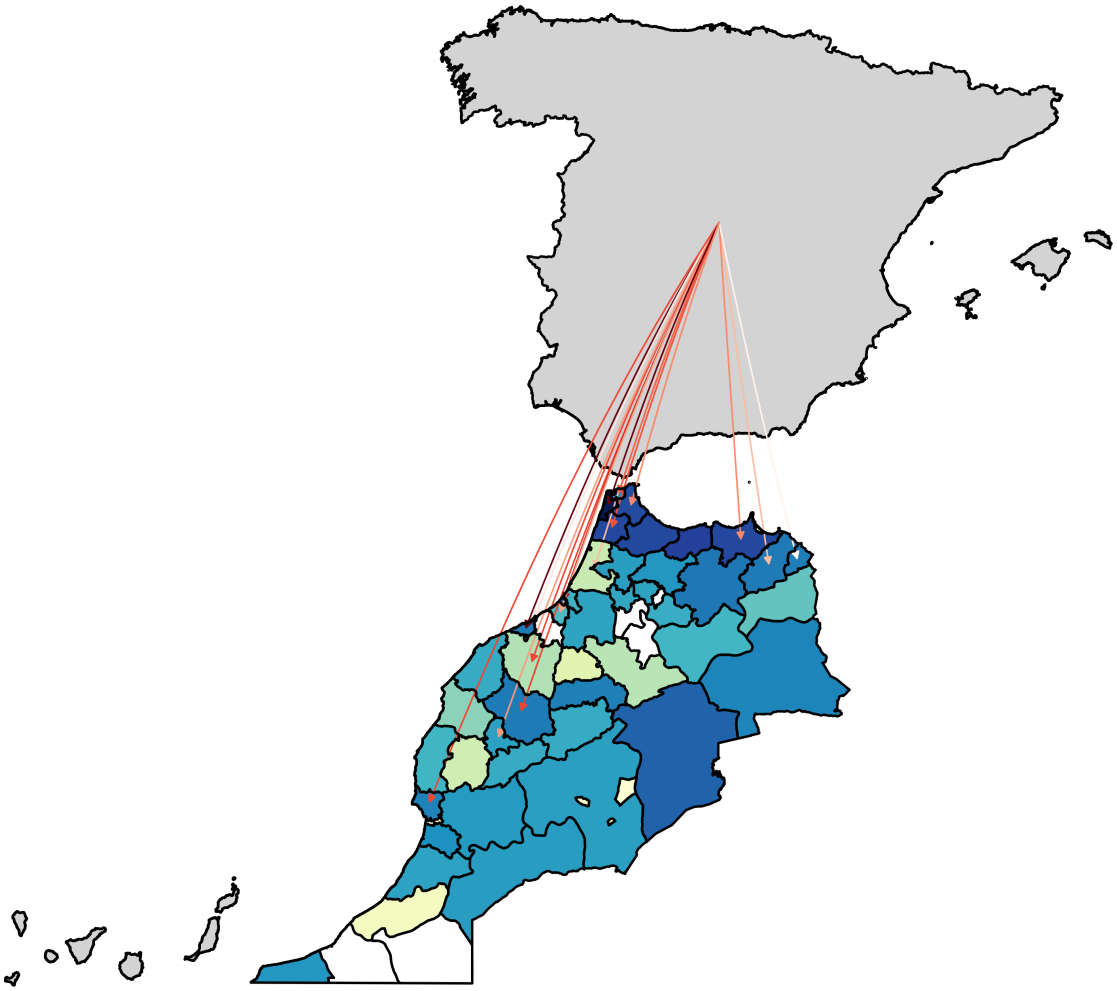


Notes: The map shows the value of commitments, in millions of US$, allocated to African ADM2 regions by European countries from 2000 to 2019. Different shades of blue represent varying ranges of commitments, while grey areas indicate regions that did not receive aid. White regions represent areas for which data are missing.

Morocco's ADM2 areas.[24] It highlights that regions with stronger ownership links are also those that have received relatively more aid from Spain. In the next section, we discuss

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

Figure 3: Spanish ownership links and aid commitments in Morocco, 2000-2019



Notes: The red arrows represent total ownership links of Spanish owners in Moroccan firms. Blue areas represent Spanish aid commitments in Moroccan ADM2 regions. Spain is depicted in grey.

the empirical strategy.

3 Empirical Strategy

In our baseline model, we examine how firm-level ownership ties impact the sub-national allocation of European project aid in Africa. Specifically, using our dyadic dataset we test whether the number of ownership ties between African firms in ADM2 region r of

country c and European firms in donor country j influences aid flows from the donor to the ADM2 region. To do so, we estimate a gravity-type regression over the period 2000-2019, where aid flows (both commitments and disbursements) are the dependent variables. These flows are explained by the extent of ownership links between donor country firms and recipient region firms, as well as a set of observable time-varying determinants of aid, pair-level fixed effects, and donor and recipient-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 and recipient-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. For robustness, we also test the role of the presence of links between donor country firms and recipient region firms instead of focusing on the extent of these links. This helps to ensure that the observed effects are not driven solely by the magnitude of ties, but also by their existence. The full empirical model is presented in Equation 1:

$$Aid_{r,c,j,t} = \beta_0 + \beta_1 Ownershiplink_{r,c,j,t-1} + \delta_{jr} + \tau_{ct} + \gamma_{jt} + \varepsilon_{c,j,r,t} \tag{1}$$

where $Aid_{r,c,j,t}$ is the logarithm of aid commitments in constant 2014 US$ allocated to recipient region r of country c by donor j in year t, and $Ownershiplink_{r,c,j,t-1}$ is the number of owners of firms located in recipient region r of country c originating from the donor country j in the previous year $t-1$. The lagging of ownership links by one year helps mitigate potential endogeneity issues.[25] δ_{jr} are donor-region pair fixed effects to account for time invariant and group specific factors that may influence aid allocation. Additionally, τ_{ct} and γ_{jt} are donor-year and recipient-year fixed effects, respectively, which account for time-varying heterogeneity in the provision and demand for aid. The standard error $\varepsilon_{c,j,r,t}$ is clustered at the recipient country level, to adjust for within-country correlation over time.

Our specifications provide different perspectives on economically-determined aid allocation patterns. To align with the literature on aid allocation while incorporating granular measures of economic links, we include a set of region-level controls, as outlined in Bom-

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

prezzi et al. (2024). These controls capture key, spatially-defined economic factors that are likely to influence aid distribution and provide a more comprehensive understanding of the determinants of aid allocation. Specifically, we include a dummy variable equal to 1 if a region contains a port, mine, or capital city in a given year. Regional connectivity is measured using road density, defined as the total kilometers of road per square kilomete km/km^2. To capture economic development, we use the logarithm of mean nightlight emissions, a standard proxy for regional economic activity.[26] Lastly, we control for the logarithm of the total population to account for demographic differences across regions.

While we adopt time-varying measures of these controls, their practical variability can be minimal, as factors such as the number of newly constructed ports or mines may take decades to materialize. 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 European firms might choose to invest in regions receiving more aid. We address this issue using an instrumental variable strategy, as discussed in Section 5. The next section describes the results.

4 Results

4.1 Baseline Results

The results of the empirical strategy are presented in Table 1. Columns 1 to 3 shows the results when the analysis is conducted at the ADM2 level, while columns 4 to 6 show results at the ADM1 level. For the ADM2 analysis, column 1 includes ADM2-donor pair fixed effects, column 2 augments the specification by adding donor-year and recipient-year

[26] As is standard, we add 0.01 before applying the logarithm to variables with possible zero values to avoid undefined transformations.

fixed effects, and column 3 incorporates the region-level controls outlined in the previous section while excluding ADM2-donor pair fixed effects. Across all three specifications, the number of ownership links originating from European countries in region r is positively and significantly associated with higher European aid commitments. Notably, in our preferred specification (column 2), each additional ownership link corresponds to a 5.7% increase in aid commitments. Given that the average commitment amounts to 18,778.14 US$, it is equivalent to an average increase in the amount of aid received by each ADM2 region to 1,070.35 US$. These findings provide robust evidence of the relationship between firm-level ties and subnational aid allocation in Africa.

Once controls are included (column 3), the coefficient for total ownership links becomes larger in absolute terms. Additionally, increases in mean nightlight emissions, population, geographic area size, and the presence of the capital city or at least one port are all significantly associated with higher European aid.[27] Turning to the analysis at the ADM1 level (columns 4-6), similar conclusions are reached. However, the coefficient for total ownership links is smaller in absolute terms across all specifications, which aligns with expectations. This is because ADM1 regions represent larger geographic areas, where aid allocation is less precisely targeted compared to the smaller ADM2 regions. Consequently, the effects are estimated with less precision at this broader geographic level.

In Table 2, the results are presented by aid sector, using the same specification as in previous tables, which includes region-donor pair fixed effects, as well as donor-year and recipient-year fixed effects. The dependent variable is the logarithm of aid commitments, given to region r of country c by donor j in year t, distinguished by sector: economic (column 1), emergency (column 2), and social (column 3). The results suggest that an additional ownership link between European firms and African regions leads to an increase in aid in each of the sectors. However, only the economic and social sectors show statistically significant associations. Specifically, the coefficients for the economic and social sectors indicate that firm-level ownership links have a meaningful impact on aid allocation in these areas, while the emergency sector does not exhibit significant results.

Finally, Table 3 presents the results of the analysis by firm sector. The specification

[27]However, it is worth noting that this specification excludes the ADM2-donor pair fixed effects, resulting in a reduction in the R^2 index.

Table 1: Firm linkages and total aid commitments, 2000-2019

	log(Commitments)					
	(1)	(2)	(3)	(4)	(5)	(6)
	ADM2	ADM2	ADM2	ADM1	ADM1	ADM1
Total ownership links	0.0596***	0.0557***	0.177***	0.0407***	0.0307***	0.140***
	(0.0134)	(0.0118)	(0.0524)	(0.0135)	(0.00847)	(0.0371)
(log) Nightlight			0.0249***			0.0686**
			(0.00594)			(0.0306)
(log) Population			0.0328**			0.166
			(0.0136)			(0.104)
Capital city			1.872***			1.294***
			(0.262)			(0.266)
Mine			0.0332			0.0819
			(0.0266)			(0.0819)
Oil/gas			-0.0180			0.00186
			(0.0117)			(0.0742)
(log) Area			0.0257***			0.0929*
			(0.00719)			(0.0482)
Port			0.144*			0.195
			(0.0765)			(0.120)
Road density			0.0658			0.0131
			(0.0581)			(0.00779)
Observations	2,135,789	2,135,789	1,777,769	255,473	255,473	188,639
Avg. commitments aid	18,778.14	18,778.14	17,879.39	156,987.79	156,987.79	169,658.45
R-squared	0.327	0.337	0.071	0.402	0.442	0.191
ADM2 x Donor FE	Yes	Yes				
Donor x Year		Yes	Yes		Yes	Yes
Recipient x Year		Yes	Yes		Yes	Yes
ADM1 x Donor FE				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 j. Columns 1 to 3 refer to ADM2 regions, while columns 4 to 6 refer to ADM1 regions. *Total ownership links* is the number of ownership links between region r of country c and donor country j in year $t-1$. Columns 1 and 2 (4 and 5) include ADM2 (ADM1) x donor fixed effects, while columns 2, 3, 5, and 6 also include donor x year, and recipient x year fixed effects. Columns 3 and 6 include additional controls such as: $(log)Nightlight$, the logarithm of mean nightlight emissions plus 0.01; $(log)Population$, the logarithm of population; *Capital city*, a dummy equal to 1 if the region contains the capital city; $Mine$, a dummy equal to 1 if the region contains an active mine; Oil/gas, a dummy equal to 1 if the region contains a petroleum field; $(log)Area$, the logarithm of the regions size in km^2; $Port$, dummy equal to 1 if the region contains at least one port; *Road density*, the road density in the region in km/km^2. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

includes region-donor pair fixed effects, as well as donor-year and recipient-year fixed effects. However, the number of total ownership links is disaggregated by the sector of the firms in question. Specifically, instead of summing all ownership links between a region and a donor in a given year, the links are summed separately for each sector.[28] The results indicate that an additional ownership link in any sector is significantly associated with larger aid commitments. The next section will provide a detailed analysis of the results by donor, offering insights into the differences in how various donors allocate aid based on their firm-level ownership links with recipient regions.

Table 2: Firm linkages and total aid commitments by aid sector, 2000-2019

	log(Commitments)		
	(1)	(2)	(3)
	Economic	Emergency	Social
Total ownership links	0.0144**	0.00198	0.0557***
	(0.00601)	(0.00170)	(0.0148)
Observations	2,135,790	2,135,790	2,135,790
R-squared	0.201	0.168	0.312
ADM2 x Donor FE	Yes	Yes	Yes
Donor x Year	Yes	Yes	Yes
Recipient 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 j, distinguished by aid sector: economic (column 1), emergency (column 2), and social (column 3). *Total ownership links* is the number of total ownership links between region r of country c and donor j in year $t-1$. All columns include ADM2 x donor, donor x year, and recipient x year fixed effects. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

[28] Firms' sectors are described in Section 2.1

Table 3: Firm linkages and total aid commitments by firm sector, 2000-2019

	log(Commitments)							
	(1) Agriculture	(2) Communication	(3) Construction	(4) Energy	(5) Manufacturing	(6) Mining	(7) Retail	(8) Other
Total ownership links	0.634**	0.414***	0.511**	1.545***	0.236***	0.333***	0.243***	0.101***
	(0.276)	(0.0477)	(0.202)	(0.276)	(0.0367)	(0.0505)	(0.0200)	(0.0181)
Observations	2,135,789	2,135,789	2,135,789	2,135,789	2,135,789	2,135,789	2,135,789	2,135,789
R-squared	0.337	0.337	0.337	0.337	0.337	0.337	0.337	0.337
ADM2 x Donor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Donor x Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient x Year	Yes	Yes	Yes	Yes	Yes	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 j. *Total ownership links* is the number of total ownership links between region r of country c and donor j in year $t-1$ measured for sectors: agriculture (column 1), communication (column 2), construction (column 3), energy (column 4), manufacturing (column 5), mining (column 6), retail (column 7), and other (column 8). All columns include ADM2 x donor, donor x year, and recipient x year fixed effects. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

4.2 Donor by donor Result

In this section, we uncover interesting differences among donors. Specifically, following Alesina and Dollar (2000), we focus on the six main European individual donors, such as Belgium, France, Germany, Italy, the Netherlands, the so-called Nordic countries (Denmark, Finland, Norway and Sweden), and the United Kingdom. We run the same specification of Equation 1 for each donor. This allows us to examine how the relationship between ownership links and aid commitments varies across donors, providing insights into their individual aid allocation strategies and how they may differ in terms of geographical targeting and sectoral preferences.

Table 4 presents the results. As can be seen, Belgium (column 1), France (column 2), Germany (column 2), the Nordic countries (column 6) and the UK (column 7) give more aid to ADM2 regions in which they have an additional ownership link. More precisely, the highest coefficient is observed for Belgium, for which an additional ownership link is associated with an increase of 14.6% in aid, while the lowest corresponds to the UK which registers a 3% increase.[29] Table A.2, in the Appendix, shows the results when including controls and excluding ADM2-donor pair fixed effects. In this specification, all coefficients related to ownership are positive and significant, except for the Nordic countries. However, this specification is less precisely estimated due to the exclusion of ADM2-donor pair fixed effects, which may introduce some bias and reduce the robustness of the estimates.

The donor-specific results provide valuable insight into how economic ties between donor and recipient countries correlate with the aid allocation process. Notably, the strongest correlations are observed for France and Belgium, which have historically strong colonial ties that are known to influence aid allocation. These results suggest that even after controlling for these colonial relationships through pair-fixed effects, economic ties continue to play a significant role in the allocation of aid. This finding underscores the importance of identifying the specific channels through which economic ties shape aid allocation, providing deeper insights beyond historical or political factors. In the next section, we employ an IV strategy to address potential endogeneity concerns in aid allocation.

[29] Despite being positive, the coefficients for Italy and the Netherlands are not significant at the 10% level.

Table 4: Firm linkages and total aid commitments by major donors, 2000-2019

	log(Commitments)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Belgium	France	Germany	Italy	Netherlands	Nordic	UK
Total ownership links	0.136***	0.0953***	0.0772***	0.00294	0.0177	0.0903***	0.0303***
	(0.0355)	(0.0278)	(0.0168)	(0.0303)	(0.0329)	(0.0177)	(0.00390)
Observations	118,655	118,655	118,655	118,655	118,655	474,620	118,655
R-squared	0.435	0.352	0.321	0.380	0.244	0.290	0.276
ADM2 x Donor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Donor x Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient x Year	Yes	Yes	Yes	Yes	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: Belgium (column 1), France (column 2), Germany (column 3), Italy (column 4), Netherlands (column 5), the Nordic countries (column 6), and the UK (column 7). *Total ownership links* is the number of total ownership links between region r of country c and donor j in year $t-1$. All columns include ADM2 x donor, donor x year, and recipient x year fixed effects. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

5 Instrumental Variables Strategy

A potential concern in the estimation of Equation 1 is the possibility of reverse causality, where aid may influence the economic activities of European companies abroad. Specifically, European firms might be more likely to invest in African regions that receive more aid, introducing bias in our estimates. To address this issue, we re-estimate Equation 1 using an instrumental variable (IV) approach. We rely on a shift-share IV, following the methodology outlined by Sonno (2024).

The strategy consists in instrumenting the number of European firms' affiliates in African regions by a measure of financial health of the parent companies. The logic behind this strategy is that the activity of a firm's foreign affiliates 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.

As in Sonno (2024), we utilize a three part IV, which introduces variation at the firm, year, and aid recipient-region level. First, we interact the parent's firm dependence on external credit during the previous decade ($dep^{m}_{97,06}$) with a measure of international credit availability, cre_{t-1}.[30] Together, this comprises the shift component of our shift-share IV. The share component is instead given by $w^{m}_{r,c,j,2007}$, which measures the share of the affiliates of each parent m' in the African region r of the country c from the donor j in 2007, capturing the presence of a specific European firm in an African region at the beginning of our sample.

The instrument captures how the global credit environment may affect the decisions of European 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.[31]

[30] 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-1} is proxied by financial resources provided to the private sector globally, excluding African countries, and weighted by each countrys GDP, which is retrieved from the World Development Indicators (WDI).

[31] Goldsmith-Pinkham et al. (2020) argue that a Bartik (shift-share) style instrument relying on differential effects of common shocks are essentially a difference-in-differences style analysis. For exogeneity,

Additionally, we restrict our analysis to firms with an ownership threshold above 50%, as this most closely aligns with the GUO ("Global Ultimate Owner") definition of an affiliate owner used in Sonno (2024). Additionally, since our instrument relies on the assumption that affiliates may face constraints in their activity due to the financial stability of their owner, it is more plausible that their exposure to the owner's stability increases with the ownership share.

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, that is:

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

With 2, we introduce variation at the donor-aid recipient region-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 time t. The initial share of European owners for each pair of African region and donor, $w^{m}_{r,c,j,2007}$, is used as a weighting strategy to maintain exogeneity. While the credit need of European firms 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

there should therefore be no differential effects on the outcome (aid) due to differential exposure to common shocks. We argue below for the exogeneity of our share component, and in future versions of the paper plan on testing for correlates of our share variable which could affect aid through other channels besides parent firm financial health.

conditions of European parent firms and global credit availability, effectively mitigating potential reverse causality from aid flows to firm ownership decisions. Additionally, since the aid budget is typically pre-determined and planned in advance by donor countries, the potential for aid to respond directly to changes in firm ownership is minimized.

Table 5 presents the results of the 2SLS estimation. As observed, the F-statistic exceeds a standard threshold of 10 in only three out of the six specifications, suggesting that the instrument may be weak in some cases, despite being very close to such threshold. The first stage is significant at the 1% level across all specifications, denoting that an increase in credit availability raises the number of affiliates of about 45.4% (column 2). In the second stage, we find that the total ownership links in both ADM2 (columns 1-3) and ADM1 regions (columns 4-6) are significantly and positively associated with the total commitments received by the region. More precisely, in our preferred specification (column 2), each additional ownership link corresponds to a 26% increase in total aid.[32] As can be seen, results are much larger with respect to the case without the use of the IV strategy (see Table 1). The next section presents several robustness checks to further validate the reliability and robustness of our results.

6 Robustness

In this section we run a number of alternative specifications to test the robustness of our results by considering different definitions of ownership and aid. We begin by re-estimating our baseline model using two different ways of measuring ownership. Table 6 presents the results when our variable of interest is a dummy equal to 1 if the region r of country c has at least one ownership link with donor country j in year *t-1*, as opposed to using the variable that captures the number of ownership links. As shown, the results remain consistent across all specifications, and the coefficients are larger in absolute terms.

In addition, we also measure the number of ownership links by considering the direct ownership share, as opposed to the total ownership links. Specifically, we re-estimate our baseline equation using the number of direct ownership links as the main variable of

[32]Given the average commitment amounts to 23,292.77 US$, it is equivalent to an average increase in the amount of aid received by each ADM2 region to 6,052.84 US$.

Table 5: Firm linkages and total aid commitments, IV strategy 2007-2019

	log(Commitments)					
	(1)	(2)	(3)	(4)	(5)	(6)
	ADM2	ADM2	ADM2	ADM1	ADM1	ADM1
Total ownership links	0.235**	0.231**	0.371***	0.225**	0.187*	0.368***
	(0.105)	(0.104)	(0.0836)	(0.107)	(0.102)	(0.0922)
(log) Nightlight			0.0309***			0.102***
			(0.00652)			(0.0360)
(log) Population			0.0352**			0.131
			(0.0155)			(0.113)
Capital city			1.884***			1.148***
			(0.271)			(0.288)
Mine			0.0434			0.107
			(0.0327)			(0.0960)
Oil/gas			-0.0180			0.0608
			(0.0128)			(0.104)
(log) Area			0.0328***			0.154**
			(0.00879)			(0.0602)
Port			0.0559			0.0473
			(0.0769)			(0.126)
Road density			0.0586			0.00929
			(0.0556)			(0.00833)
Observations	1,461,329	1,461,329	1,219,733	174,797	174,797	129,887
Avg. commitments	23,292.77	23,292.77	22,075,04	194,731.01	194,731.01	208,468.75
ADM2 x Donor FE	Yes	Yes				
Donor x Year		Yes	Yes		Yes	Yes
Recipient x Year		Yes	Yes		Yes	Yes
ADM1 x Donor FE				Yes	Yes	
Kleibeergen - Paap F stat	8.92	9.66	19.46	8.77	10.93	15.79
First stage	0.479***	0.454***	0.061***	1.014***	0.865***	0.087***
	(0.1604)	(0.1461)	(0.0138)	(0.3423)	(0.2616)	(0.022)

Notes: The dependent variable is the logarithm of aid commitments (plus 1) allocated to region r of country c in year t from donor j. Columns 1 to 3 refer to ADM2 regions, while columns 4 to 6 refer to ADM1 regions. *Total ownership links* is the number of ownership links between region r of country c and donor country j in year $t-1$. Columns 1 and 2 (4 and 5) include ADM2 (ADM1) x donor fixed effects, while columns 2, 3, 5, and 6 also include donor x year, and recipient x year fixed effects. Columns 3 and 6 include additional controls such as: $(log)Nightlight$, the logarithm of mean nightlight emissions plus 0.01; $(log)Population$, the logarithm of population; *Capital city*, a dummy equal to 1 if the region contains the capital city; $Mine$, a dummy equal to 1 if the region contains an active mine; Oil/gas, a dummy equal to 1 if the region contains a petroleum field; $(log)Area$, the logarithm of the regions size in km^2; $Port$, dummy equal to 1 if the region contains at least one port; *Road density*, the road density in the region in km/km^2. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

interest, which reflects the ownership share held by donor country firms in the recipient region. As shown in Table 7, while the sign of the coefficient remains positive across all specifications, it is only significant when pair fixed effects are excluded (columns 3 and 6). Moreover, all coefficients are smaller in absolute terms compared to the baseline results.

We also find that our results hold when we re-estimate the baseline model using the logarithm of aid disbursements instead of aid commitments as the dependent variable. Table 8 shows that the results are robust across all specifications and quantitatively very similar to the results on aid commitments. This suggests that project flows, which are initially determined by ownership links in terms of commitments, remain consistent over time in terms of disbursements.

Finally, since the dependent variable exhibits a large number of zeros, we re-estimate the baseline results using a Poisson Pseudo-Maximum Likelihood (PPML) estimator. However, as the algorithm used in the estimation procedure drops a large number of observations that are separated by fixed effects, we include ADM2 and recipient-donor pair fixed effects, instead of ADM2-donor pair fixed effects, to avoid losing too many observations. As shown by Table 9 the baseline results hold, but the coefficient on ownership links is in absolute terms much smaller. This suggests that the PPML estimator accounts for the zero observations and might slightly downscale the effect of ownership links on aid allocation.

7 Conclusions

This paper leverages granular data on subnational economic ties between 18 main European donor countries and African administrative regions to test a gravity model of aid flows. Using dyadic donor country-ADM2 recipient region data, we examine whether more European aid is allocated to ADM2 regions that have more economic ties with the donor country, proxied through the use of firm ownership data derived from Orbis. This approach allows us to capture the nuanced influence of ownership links on aid allocation patterns at the subnational level, offering a more detailed understanding of how economic ties shape aid flows between donor and recipient regions.

Table 6: Presence of firm linkages and total aid commitments, 2000-2019

	log(Commitments)					
	(1)	(2)	(3)	(4)	(5)	(6)
	ADM2	ADM2	ADM2	ADM1	ADM1	ADM1
Having ownership links	0.458***	0.312***	1.315***	0.841***	0.179*	1.597***
	(0.0985)	(0.0843)	(0.196)	(0.122)	(0.0923)	(0.192)
(log) Nightlight			0.0240***			0.0656**
			(0.00587)			(0.0303)
(log) Population			0.0310**			0.160
			(0.0132)			(0.102)
Capital city			1.761***			1.140***
			(0.250)			(0.252)
Mine			0.0273			0.0615
			(0.0249)			(0.0806)
Oil/gas			-0.0184*			-0.0225
			(0.0106)			(0.0756)
(log) Area			0.0268***			0.0956*
			(0.00724)			(0.0477)
Port			0.137*			0.148
			(0.0745)			(0.120)
Road density			0.0614			0.0103
			(0.0560)			(0.00755)
Observations	2,135,789	2,135,789	1,777,769	255,473	255,473	188,639
R-squared	0.327	0.337	0.069	0.402	0.442	0.190
ADM2 x Donor FE	Yes	Yes				
Donor x Year		Yes	Yes		Yes	Yes
Recipient x Year		Yes	Yes		Yes	Yes
ADM1 x Donor FE				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 j. Columns 1 to 3 refer to ADM2 regions, while columns 4 to 6 refer to ADM1 regions. *Having ownership links* is a dummy equal to 1 if the region r of country c has at least one total ownership link with donor j in year $t-1$. Columns 1 and 2 (4 and 5) include ADM2 (ADM1) x donor fixed effects, while columns 2, 3, 5, and 6 include donor x year, and recipient x year fixed effects. Columns 3 and 6 include additional controls such as: $(log)Nightlight$, the logarithm of mean nightlight emissions plus 0.01; $(log)Population$, the logarithm of population; *Capital city*, a dummy equal to 1 if the region contains the capital city; $Mine$, a dummy equal to 1 if the region contains an active mine; Oil/gas, a dummy equal to 1 if the region contains a petroleum field; $(log)Area$, the logarithm of the regions size in km^2; *Port*, dummy equal to 1 if the region contains at least one port; *Road density*, the road density in the region in km/km^2. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Direct firm linkages and total aid commitments, 2000-2019

	log(Commitments)					
	(1)	(2)	(3)	(4)	(5)	(6)
	ADM2	ADM2	ADM2	ADM1	ADM1	ADM1
Direct ownership links	0.0128	0.0101	0.0126**	0.00937	0.00236	0.00929**
	(0.00804)	(0.00782)	(0.00494)	(0.00650)	(0.00597)	(0.00424)
(log) Nightlight			0.0244***			0.0612*
			(0.00580)			(0.0314)
(log) Population			0.0350**			0.185*
			(0.0139)			(0.107)
Capital city			1.966***			1.407***
			(0.276)			(0.294)
Mine			0.0310			0.0726
			(0.0267)			(0.0823)
Oil/gas			-0.0188			-0.0143
			(0.0127)			(0.0755)
(log) Area			0.0244***			0.0800
			(0.00720)			(0.0494)
Port			0.195**			0.272**
			(0.0810)			(0.120)
Road density			0.0711			0.0156
			(0.0618)			(0.00930)
Observations	2,135,789	2,135,789	1,777,769	255,473	255,473	188,639
R-squared	0.327	0.337	0.066	0.402	0.442	0.186
ADM2 x Donor FE	Yes	Yes				
Donor x Year		Yes	Yes		Yes	Yes
Recipient x Year		Yes	Yes		Yes	Yes
ADM1 x Donor FE				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 j. Columns 1 to 3 refer to ADM2 regions, while columns 4 to 6 refer to ADM1 regions. *Direct ownership links* is the number of direct ownership links that the region r of country c has with country j in year $t-1$. Columns 1 and 2 (4 and 5) include ADM2 (ADM1) x donor fixed effects, while columns 2, 3, 5, and 6 include donor x year, and recipient x year fixed effects. Columns 3 and 6 include additional controls such as: $(log)Nightlight$, the logarithm of mean nightlight emissions plus 0.01; $(log)Population$, the logarithm of population; *Capital city*, a dummy equal to 1 if the region contains the capital city; $Mine$, a dummy equal to 1 if the region contains an active mine; Oil/gas, a dummy equal to 1 if the region contains a petroleum field; $(log)Area$, the logarithm of the regions size in km^2; $Port$, dummy equal to 1 if the region contains at least one port; *Road density*, the road density in the region in km/km^2. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Firm linkages and total aid disbursements, 2000-2019

	log(Disbursements)					
	(1)	(2)	(3)	(4)	(5)	(6)
	ADM2	ADM2	ADM2	ADM1	ADM1	ADM1
Total ownership links	0.0585***	0.0526***	0.218***	0.0409**	0.0277**	0.169***
	(0.0183)	(0.0161)	(0.0549)	(0.0168)	(0.0107)	(0.0350)
(log) Nightlight			0.0336***			0.0852**
			(0.00802)			(0.0359)
(log) Population			0.0407**			0.205*
			(0.0161)			(0.119)
Capital city			2.144***			1.382***
			(0.293)			(0.287)
Mine			0.0465			0.0559
			(0.0348)			(0.0925)
Oil/gas			-0.0239*			0.00663
			(0.0141)			(0.0825)
(log) Area			0.0337***			0.111**
			(0.00971)			(0.0544)
Port			0.193*			0.257*
			(0.104)			(0.147)
Road density			0.0822			0.0140
			(0.0674)			(0.00845)
Observations	2,135,660	2,135,660	1,777,687	255,379	255,379	188,578
R-squared	0.396	0.410	0.085	0.467	0.519	0.231
ADM2 x Donor FE	Yes	Yes				
Donor x Year		Yes	Yes		Yes	Yes
Recipient x Year		Yes	Yes		Yes	Yes
ADM1 x Donor FE				Yes	Yes	

Notes: The dependent variable is the logarithm of aid disbursements (plus 1) given to region r of country c in year t by donor j. Columns 1 to 3 refer to ADM2 regions, while columns 4 to 6 refer to ADM1 regions. *Total ownership links* is the number of ownership links that the region r of country c has with country j in year $t-1$. Columns 1 and 2 (4 and 5) include ADM2 (ADM1) x donor fixed effects, while columns 2, 3, 5, and 6 include donor x year, and recipient x year fixed effects. Columns 3 and 6 include additional controls such as: $(log)Nightlight$, the logarithm of mean nightlight emissions plus 0.01; $(log)Population$, the logarithm of population; *Capital city*, a dummy equal to 1 if the region contains the capital city; $Mine$, a dummy equal to 1 if the region contains an active mine; Oil/gas, a dummy equal to 1 if the region contains a petroleum field; $(log)Area$, the logarithm of the regions size in km^2; $Port$, dummy equal to 1 if the region contains at least one port; *Road density*, the road density in the region in km/km^2. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Firm linkages and total aid commitments, 2000-2019, PPML estimates

	log(Commitments)					
	(1)	(2)	(3)	(4)	(5)	(6)
	ADM2	ADM2	ADM2	ADM1	ADM1	ADM1
Total ownership links	0.00681***	0.00305**	0.0190***	0.00573***	0.00242*	0.0141***
	(0.00228)	(0.00121)	(0.00243)	(0.00209)	(0.00141)	(0.00373)
(log) Nightlight			0.205***			0.0715
			(0.0578)			(0.0583)
(log) Population			0.309**			0.510***
			(0.126)			(0.120)
Capital city			1.771***			1.045***
			(0.269)			(0.323)
Mine			0.308***			-0.0644
			(0.114)			(0.120)
Oil/gas			0.498**			0.109
			(0.253)			(0.169)
(log) Area			0.149**			0.0777
			(0.0719)			(0.0690)
Port			0.380			0.588***
			(0.313)			(0.213)
Road density			0.0809*			0.0179
			(0.0434)			(0.0142)
Observations	791,634	719,593	1,579,293	191,671	173,760	165,883
ADM2 FE	Yes	Yes				
Recipient x Donor FE	Yes	Yes		Yes	Yes	
Donor x Year		Yes	Yes		Yes	Yes
Recipient x Year		Yes	Yes		Yes	Yes
ADM1 x Donor FE				Yes	Yes	
ADM1 FE				Yes	Yes	

Notes: The dependent variable is the amount of aid commitments given to region r of country c in year t by donor j. Columns 1 to 3 refer to ADM2 regions, while columns 4 to 6 refer to ADM1 regions. *Total ownership links* is the number of ownership links that the region r of country c has with country j in year $t-1$. Columns 1 and 2 (4 and 5) include ADM2 (ADM1) and recipient x donor fixed effects, while columns 2, 3, 5, and 6 include donor x year, and recipient x year fixed effects. Columns 3 and 6 include additional controls such as: $(log)Nightlight$, the logarithm of mean nightlight emissions plus 0.01; $(log)Population$, the logarithm of population; *Capital city*, a dummy equal to 1 if the region contains the capital city; $Mine$, a dummy equal to 1 if the region contains an active mine; Oil/gas, a dummy equal to 1 if the region contains a petroleum field; $(log)Area$, the logarithm of the regions size in km^2; $Port$, dummy equal to 1 if the region contains at least one port; *Road density*, the road density in the region in km/km^2. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1

When controlling for indicators of need and various fixed effects, we find that, on average, an increase by one ownership link in an ADM2 region corresponds to a 5.7% increase in aid. We find similar results when focusing on ADM1 regions, despite the coefficients are in absolute term smaller. Furthermore, we identify that the aid sectors most responsible for these findings are economic and social sectors. Our results are also robust to a series of alternative specifications, including different measures of aid. Focusing on individual donors, we find that all donors, excluding Italy and the Netherlands, allocate higher aid commitments to African regions with ownership links to firms from their respective countries. This effect persists within countries and across first-level administrative regions. Consequently, we find that, beyond political considerations, European aid may be susceptible to "economic capture," where aid allocations are influenced by the economic interests and ties of donor country firms. In future versions, we plan on leveraging this rich firm-level heterogeneity to tease out the precise channels through which subnational economic ties affect aid allocation by donors.

The study suggests that European aid allocation may be influenced by economic ties between donor and recipient countries, potentially leading to "economic capture" where regions with stronger ties receive more aid. This raises concerns about the impartiality of aid distribution. Policymakers should focus on enhancing transparency and ensuring that aid is allocated based on need rather than economic interests. Recipient countries may leverage economic ties to attract aid but should be cautious not to let these ties skew development priorities. Lastly, international organizations should monitor aid flows to ensure that support reaches the most vulnerable regions, regardless of their economic connections. Future research will seek to disentangle whether parent firms in donor countries directly lobby for increased aid to regions with their affiliates, from the possibility that economically active regions naturally attract higher aid flows. It would be particularly important to assess whether these ties create distortions in aid allocation and how they might influence aid effectiveness.

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Appendix

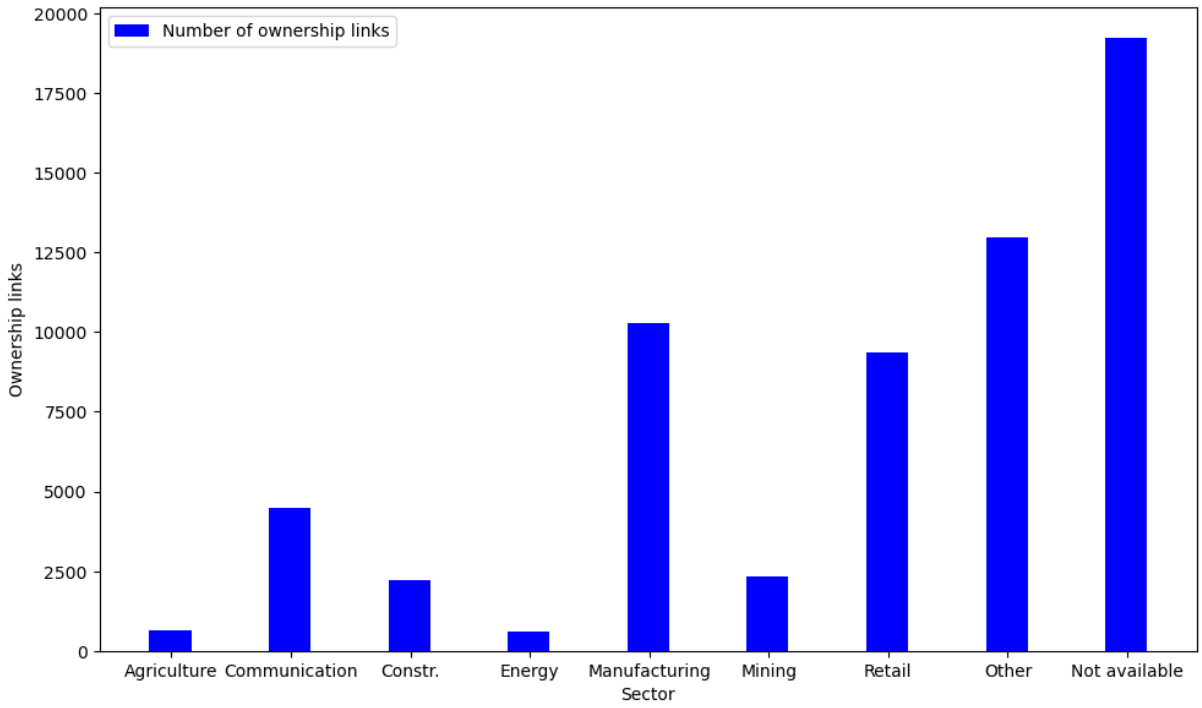
8 Additional tables and figures

Table A.1: Ownership links in African countries, 2000-2019

Country	Links	Country	Links
Algeria	2,125	Ethiopia	156
Angola	1,318	Gabon	550
Benin	525	Gambia	99
Botswana	657	Ghana	1,762
Burkina Faso	443	Guinea	508
Burundi	231	Guinea-Bissau	90
Cameroon	945	Kenya	2,190
Central African Rep.	69	Liberia	560
Chad	200	Madagascar	435
Congo	673	Malawi	393
Cote d'Ivoire	1,800	Mali	511
Democratic Rep. of Congo	1,090	Mauritania	127
Djibouti	158	Morocco	7,449
Egypt	3,229	Mozambique	1,124
Equatorial Guinea	137	Namibia	647
Eritrea	21	Niger	145
Ethiopia	156	Nigeria	1,911
Gabon	550	Rwanda	305
Gambia	99	Sao Tome And Principe	80
Ghana	1,762	Senegal	880
Guinea	508	Sierra Leone	188
Guinea-Bissau	90	Somalia	2
Kenya	2,190	South Africa	22,970
Liberia	560	South Sudan	17
Madagascar	435	Sudan	76
Malawi	393	Swaziland	213
Mali	511	Tanzania	992
Mauritania	127	Togo	413
Morocco	7,449	Tunisia	1,988
Mozambique	1,124	Uganda	169
Namibia	647	Zambia	733
Niger	145	Zimbawe	812

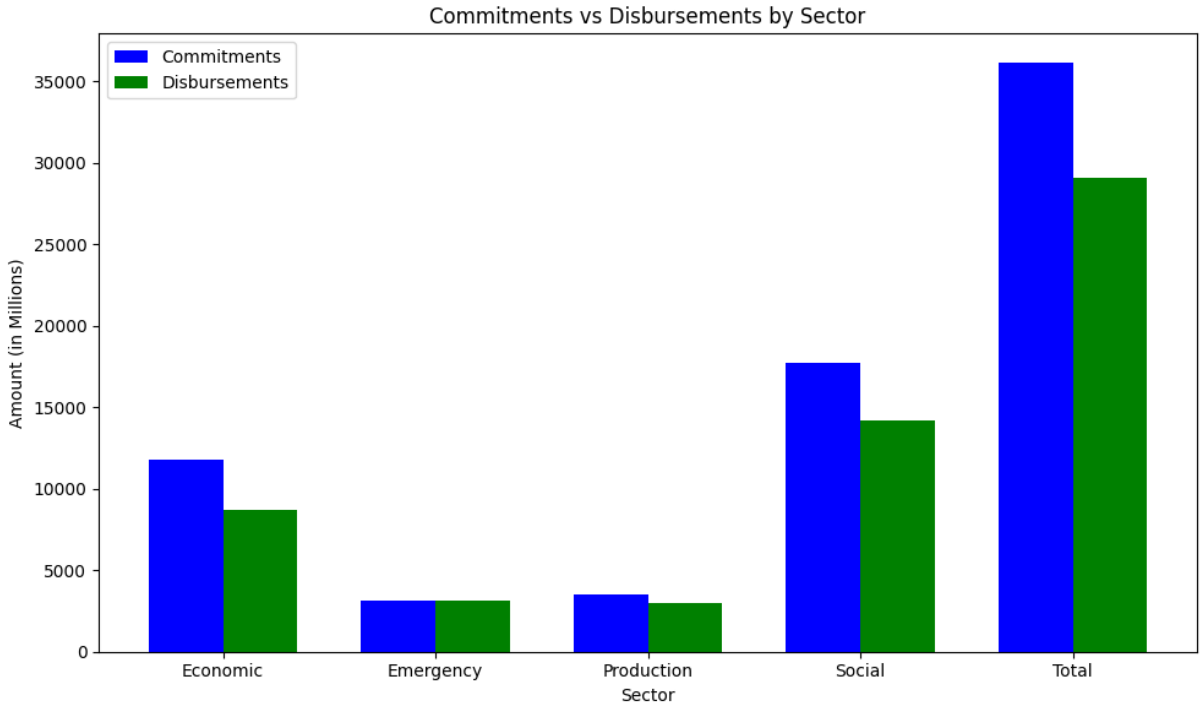
Notes: The table shows the number of ownership links from European countries for each African country in the sample.

Figure A.1: Total ownership links by firm's sector, 2000-2019



Notes: It shows total ownership links of European owners in African firms, distinguished by firm's sector. Sectors are defined accordingly to NACE Section: agriculture refers to section A; communication to sections H and J, construction to section F; energy to section D and E; manufacturing to section C; mining to section B; retail to section G and I; other from section K to U.

Figure A.2: 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 2000-2019.

Table A.2: Firm linkages and total aid by major donors with controls, 2000-2019

	log(Commitments)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Belgium	France	Germany	Italy	Netherlands	Nordic	UK
Total ownership links	0.286***	0.107***	0.284**	0.284*	0.289***	0.135	0.107**
	(0.0405)	(0.0308)	(0.137)	(0.152)	(0.0793)	(0.138)	(0.0454)
(log) Nightlight	0.0591**	0.0126	0.0744***	0.0514***	0.00955**	0.0239***	0.0221**
	(0.0236)	(0.00758)	(0.0150)	(0.0157)	(0.00469)	(0.00719)	(0.00951)
(log) Population	0.103*	0.0509**	0.0712**	0.0821**	0.0148	0.0122	0.0235
	(0.0566)	(0.0191)	(0.0327)	(0.0350)	(0.0102)	(0.00910)	(0.0154)
Capital city	2.964***	3.972***	2.820***	4.440***	1.254***	1.633***	1.291***
	(0.600)	(0.513)	(0.512)	(0.617)	(0.368)	(0.353)	(0.392)
Mine	-0.0169	0.0529	0.0475	0.181	0.0252	0.00594	0.0392
	(0.0843)	(0.0487)	(0.0868)	(0.119)	(0.0348)	(0.0343)	(0.0622)
Oil/gas	-0.0584	0.00441	-0.0703	-0.00797	-0.0172	-0.0326**	-0.0261
	(0.0367)	(0.0321)	(0.0432)	(0.0354)	(0.0195)	(0.0152)	(0.0236)
(log) Area	0.0604***	0.00484	0.0608***	0.0403*	0.0196***	0.0315***	0.0331***
	(0.0201)	(0.00895)	(0.0195)	(0.0201)	(0.00579)	(0.00948)	(0.00831)
Port	0.0602	0.270*	0.228	0.551*	0.136	0.00281	0.184
	(0.129)	(0.146)	(0.163)	(0.284)	(0.0925)	(0.0636)	(0.120)
Road density	0.0290	0.000833	0.0364	0.199	0.0916	0.0995	0.0273
	(0.117)	(0.0440)	(0.0628)	(0.118)	(0.0660)	(0.0709)	(0.0375)
Observations	98,765	98,765	98,765	98,765	98,765	296,295	98,765
R-squared	0.185	0.236	0.106	0.172	0.059	0.058	0.059
ADM2 x Donor FE	No	No	No	No	No	No	No
Donor x Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient x Year	Yes	Yes	Yes	Yes	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: Belgium (column 1), France (column 2), Germany (column 3), Italy (column 4), Netherlands (column 5), the Nordic countries (column 6), and the UK (column 7). The independent variable of interest *Total ownership links* is lagged by one year. All columns include ADM2 x donor, donor x year, and recipient x year fixed effects and the logarithm of population, a dummy = to 1 if it is the region of the capital, if it has ports, active mine, diamond, and oil or gas deposits, and the road density. Standard errors (in parenthesis) are clustered at the recipient country level. *** p<0.01, ** p<0.05, * p<0.1