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RESEARCH ARTICLE

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Who benefits from the procurement financed by Multilateral Development Banks?

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Abstract

We use a gravity model to inquire about the factors that influence the amount of public procurement awarded by developing countries with funding from Multilateral Development Banks (MDBs), based on 169 000 contracts. We reach four main conclusions. First, procurement disproportionately benefits firms of low- and middle-income countries and not those of MDBs' larger shareholders. Second, firms of upper-middle-income countries can compete successfully with those of developed countries. These two conclusions are in line with MDBs' development mandate. However, we also find that certain MDBs favour domestic firms and that having good diplomatic relations matters when awarding contracts.

KEYWORDS
Multilateral Development Banks, Poisson pseudo-maximum likelihood estimator, public procurement

1 | INTRODUCTION

Multilateral Development Banks (MDBs) support social and economic development in developing countries through advisory services, capacity building, equity, grants, guarantees, loans and policy advice. In pursuit of this institutional mission, MDBs finance the competitive acquisition of goods and services in developing countries to implement projects that support these countries' social and economic development (Morlino, 2019). Competitive acquisition is made through tenders that seek to select firms that simultaneously provide the best value-for-money and the best technical fit-for-purpose to implement those projects jointly identified by an MDB and a developing country. These competitive tenders constitute the public procurement financed by MDBs. This is important for two main reasons.

First, this is due to their size. Developing countries spend an estimated USD 820 billion yearly, about half of their total government expenditure, on procuring goods and services from the private sector locally, nationally and internationally (World Bank, 2016). Public procurement contracts awarded by developing countries with major MDB funds totaled USD 134 billion in 2018.[1] Second, they affect development. The firms awarded with the implementation of projects are the cornerstones of successful, effective and sustainable delivery of projects that MDBs finance (World Bank, 2021).

It is important to understand whether public procurement financed by MDBs benefits domestic firms in developing countries and international firms in developed countries. First, it contributes to the assessment of the development effectiveness of MDBs in supporting the social and economic development of developing countries by examining how these institutions promote the competitiveness of their firms. Second, it adds to the existing empirical work on the rise of emerging economies and their efforts to improve their positions in the world through aid, investment and diplomatic ties. In this regard, we pay particular attention in this paper to the performance of Chinese firms in MDB-financed procurement. Third, this study provides evidence of the factors that make it more likely for MDB-backed procurement to be awarded to local versus foreign firms. The study, therefore, informs MDB shareholders on how well these institutions match their motivations. Borrowing shareholders and altruistic non-borrowing shareholders would prefer that MDB-financed procurement favours domestic firms in developing countries, while self-interested non-borrowing shareholders prefer to favour international firms in developed countries (Alesina & Dollar, 2000; Civelli et al., 2016). Finally, it allows us to compare differences among MDBs in how they benefit one type of firm. We see that MDB behave differently regarding how they benefit domestic firms.

Despite its relevance, literature on competitive tenders financed by MDBs is scarce (World Bank, 2017). The World Bank (2018b) adds that 'filling the current knowledge gap is critical to build an evidence base for what works in procurement and where there is room for improvement'. Branco (1994) was the first study on the role of domestic (local) firms in government procurement contracts. The author concludes that implementing agencies should discriminate in favour of domestic firms to maximize domestic welfare. Martin et al. (1999) noted that despite legislative efforts to promote a level-playing field for procurement in the European Union, 'almost all contracts were won by domestic firms' in 1993. Brülhart and Trionfetti (2004) note that public-sector purchasers tend to favour domestic suppliers and, using a general-equilibrium model with a monopolistically competitive sector, find that a country specializes in sectors with relatively home-biassed procurement. These authors assessed government procurement contracts generally and not specifically those financed by MBDs.

Carbonnier (2013) was the first author to assess the procurement of goods and services by multilateral organizations per country of firms. Carbonnier questioned whether tied bilateral aid from donor countries positively impacted securing procurement contracts from multilateral agencies. The author considered the annual volume of goods and services financed by four MDBs and four United Nations (UN) agencies[2] and awarded to firms in 22 developed countries between 2000 and 2010. He concluded that pre-existing contracts awarded and related to the awarded firm's country of origin, the manufacturing sector's strength, the financial contributions paid to multilateral organizations and the proportion of tied bilateral aid had a statistically significant positive influence on the number of contracts awarded.

This study advances the literature on MDB-financed public procurement in four areas. First, our research question examines the role of domestic and international firms in public procurement financed by MDBs in developing countries. Second, our procurement data included contracts awarded to 193 countries. The complete list of countries is provided in the Appendix A. Third, we cover the period from 2012 to 2017. This period is relevant because it captures (a) the sizeable increase in volume and number of contracts awarded caused by the countercyclical support of the MDBs to developing countries in response to the 2008–2009 global financial crisis[3]; (b) the full impact of the first reforms of the MDBs procurement regulations, which occurred from 2008 to 2012[4]; and (c) the early impact of the second set of reforms of the MDBs procurement regulations, which were initiated in 2016. Globally, these reforms sought to attract a higher base of bidders, create more value for money to developing countries and cause MDB-financed public procurement to evolve from a predominantly technical and administrative process to a catalytic element of efficiency, transparency and accountability in using public resources (World Bank, 2019a). Finally,

our procurement data look not only at the country of the firm awarded but also at the country of project implementation and the bilateral relations between pairs of countries.

The remainder of this paper is organized as follows. Section 2 explains how public procurement financed by MDBs operates. Section 3 first discusses the database of contracts awarded to firms for implementing projects financed by MDBs in developing countries, covering nearly 169 000 entries in 193 countries from 2012 to 2017. Section 3 presents the methodology used to explain the amount of MDB-financed public procurement awarded to firms per country and pair of countries. We estimate two regressions: one to explain the amount awarded to local firms and the other to the amount awarded to international firms. Section 4 presents the results of this study. Section 5 concludes the study and summarizes our findings.

2 | PUBLIC PROCUREMENT FINANCED BY MDBS

Typically, developing countries approve of 5-year plans for their development strategies. These plans identify goals, priority sectors and projects. However, these plans require financing. The governments of these countries decide what sources are used to finance each project. For some projects, governments decide that the state budget—their capacity to raise taxes and issue sovereign bonds—is sufficient. For some other projects, governments decide that external financing, obtained from bilateral and multilateral donors and lenders, is more adequate. The decision to choose external financing from multilateral sources is mainly related to the latter's comparative advantage in offering a combination of foreign currency, countercyclical financing, access to cheaper financing and longer maturities and support with project preparation and capacity building.

In exchange for MDB financing, developing countries commit to incorporate in those projects the standards required by the banks in areas such as environmental and social safeguards, anti-corruption and anti-fraud policies, transparency, fairness and open competition in the tenders published for the private sector to implement those projects, that is, in their public procurement.

Developing countries' executing and implementing agencies (line ministries or thematic agencies) lead procurement processes to contract public work, equipment goods and consulting services. The role of the MDB is to monitor whether the selection process has followed the bank's procurement regulations and validates the acquisition and selection of the supplier proposed by the line ministry or thematic agency before the final report is approved.

The cycle of public procurement of MDBs typically occurs as follows: The process 'starts with the identification of a need, through the country's partnership strategy and project conceptualization processes, and continues through procurement planning; preparation of specifications, cost estimates, and bidding documents; bidding; bid-evaluation; and contract award' (ADB, 2021, p. 3). The most common procurement modality (see ADB, 2021, pp. 7–8 for a full list of modalities) is open competitive bidding with a two-stage process and two closed envelopes (one technical and one financial). This modality is openly advertised so that any bidder can participate. Additionally, closed envelopes promote transparency. In the end, 'the contract is awarded to the bidder who meets the appropriate standards of capability, whose bid has been determined to be substantially responsive to the bidding documents and whose offer, depending on the contract type, is the lowest evaluated cost or the best combination of quality and price' (ADB, 2018b, p. 18), typically with 80–20 weights, respectively.

3 | MATERIALS AND METHODS

3.1 | The database

Insufficient research on public procurement financed by MDBs is related to the lack of comprehensive data. The World Bank (2018b) stated that 'collecting and publishing information about public procurement systems on a global

level (…) is critical to build an evidence base for what works in procurement'. The World Bank (2017) concluded that 'international statistics fall short in systematically and comparably capturing public procurement'.

We use publicly available information on the contracts awarded to firms for implementing projects financed by the ADB, AfDB, IADB and WB, covering 168 192 entries from 2012 to 2017, totaling USD 167.0 billion. This constitutes a database of pooled cross-sectional data for 193 countries over six consecutive years. By pooling them together, we draw conclusions about multiple international organizations with the same mandate while comparing them. We cover the effects of MDB procurement policy reviews carried out from 2008 to 2012.

Most of the data used are available on MDBs' websites. While the WB and the IADB make this data available in a readily workable format, the ADB makes it available in a non-readily workable format. AfDB does not publish procurement data on its website.[5] Our database complements the information readily available on the MDB website with the data provided by the procurement departments of the ADB and AfDB upon request.[6]

The database covers all procurement contracts awarded by these four MDBs in the period above USD 1000.[7] These represent 36.2% of the total commitments of the ADB, AfDB, IADB and WB from their resources (excluding co-financing). The remaining 63.8% refer to policy-based loans and grants to sovereign clients (budget support) and to loans, equity, guarantees and technical assistance approved to non-sovereign clients, which do not generate procurement contracts. Figure 1 shows the evolution of this relationship during this period.

The data in Table 1 show that according to the country income classification by the World Bank (2020), the contracts of MDB-financed public procurement awarded between 2012 and 2017 were highly concentrated in firms of middle-income countries (70% of total procurement or USD 110.8 billion). This figure divides between USD 63.8 billion awarded to firms in upper-middle-income countries (UMICs) and USD 47 billion awarded to firms in lower-middle-income countries. Contracts awarded to firms from high-income countries (HICs) totaled USD 37.1 billion (23%), followed by firms from low-income countries (LICs), with USD 10.9 billion (7%). The histogram in Table 1

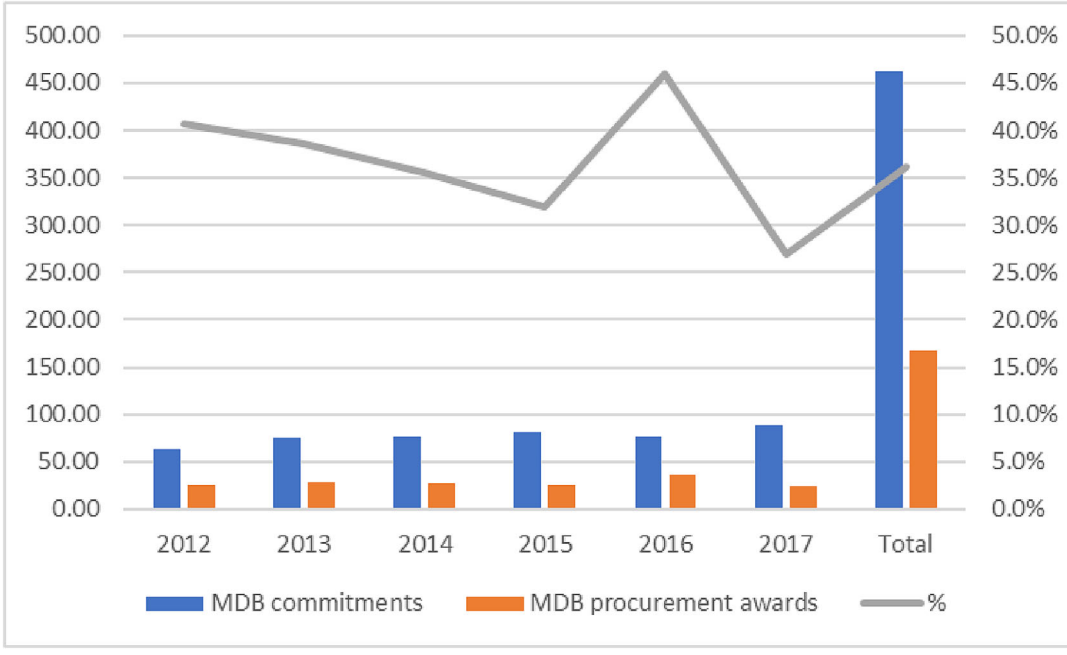
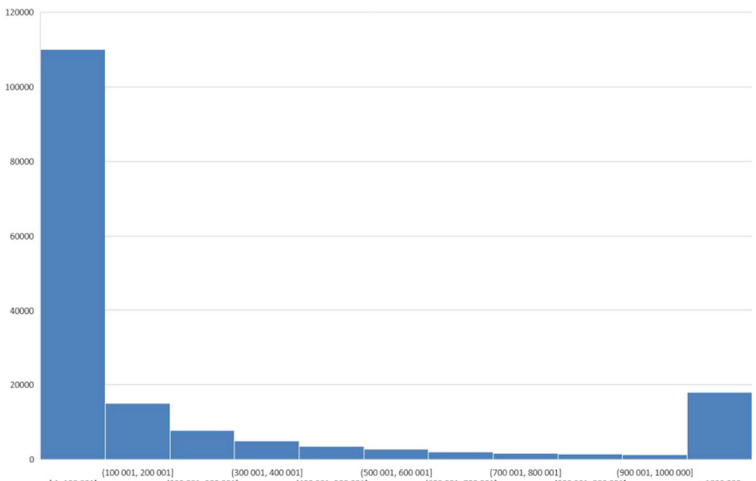


FIGURE 1 MDB-financed public procurement contracts awarded to firms versus MDB commitments signed (annually and total, between 2012 and 2017, USD billion). *Source*: Authors. The WB publishes annual commitments per fiscal year (FY2013, covering 1 July 2012, to 30 June 2013). For the sake of consistency with other MDBs, we consider WB FY commitments as calendar years in this table. [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 1 MDB-financed public procurement contracts awarded to firms between 2012 and 2017: (i) grouped according to World Bank (2020)'s country income classification (left-side) and (ii) distribution of amount awarded (USD) per number of contracts (right-side).

Country-type	USD billion (%)	Number of contracts
Upper-middle	63.8 (40%)	
Lower-middle	47.0 (30%)	
High-income	37.1 (23%)	
Low-income	10.9 (7%)	
Regional-multinational organizations	1.3 (1%)	
Average amount	948,755	
Maximum	1 100 699 000	
Minimum	1000	

Source: Authors, based on a database compiled from MDB sources. Percentages may not be 100% because of rounding.

shows that contracts awarded mainly were concentrated between 2012 and 2017 in lower amounts, particularly below USD 100 000 (110 067 contracts, representing 65.2% of all contracts), while contracts awarded above USD 1 million totaled 18 021 contracts (representing 10.7%). The average contract amount is approximately USD 950 000. The largest amount was financed by the World Bank and awarded to the Chinese firm *China Gezhouba Group Company Ltd* for the main civil works of stage I of the 2160 MW Dasu Hydropower project on the Indus River in Pakistan, which is approximately USD 1.1 billion.

Table 2 shows the top 15 countries whose firms were most successful in awarding MDB-financed public procurement. Data were disaggregated per contract awarded globally to local and international firms. This disaggregation allows for a better understanding of the competitiveness of firms in a given country in two very different environments: locally, in a market that knows better than its competitors, or externally, in markets without that comparative advantage. Globally, Chinese and Indian firms are awarded almost one-third of the total MDB-financed public procurement. Locally, Chinese firms are awarded 97% of all MDB-financed procurement awarded in China. Brazilian and Indian firms were awarded 92.2% and 84.8% of all MDB-financed procurement awarded in Brazil and India, respectively. Finally, Chinese firms are much more competitive than other firms in HICs when bidding abroad. Chinese firms are the most successful foreign firms in 36 of the 146 beneficiary countries for MDB-financed public procurement.[8] In fact, Chinese firms are more successful than local firms in 16 beneficiary countries, most of whom are in LICs whose private sector has low capacity.[9] In Pakistan, only Chinese firms have been awarded USD 4 billion in MDB-financed contracts. Apart from Chinese firms, 11 of the top 15 most successful countries abroad are HICs. The remaining three countries were India, Turkey and Brazil. The firms in these three countries are as competitive in MDB-financed procurement as those of HICs.

Some limitations apply to the information provided in the database. Martin et al. (1999) identify similar caveats for public procurement data of EU member states in 1993, referring to 'doubts about the ultimate ownership of firms and sourcing of components'. First, MDBs define a firm's nationality according to its place of registration.

TABLE 2 Top 15 countries by volume of contracts awarded to firms in MDB-financed public procurement between 2012 and 2017 (total, as local firms and as international firms).

Total			As local firms			As international firms		
Country	USD billion	% of total	Country	USD billion	% of all contracts awarded in this country	Country	USD billion	% of total
China	30.8	19.2	India	15.6	84.8	China	18.6	12.6
India	20.4	12.8	China	12.1	97.0	Spain	6.0	3.7
Brazil	10.6	6.6	Brazil	9.5	92.2	India	4.9	3.4
Argentina	6.4	4.0	Argentina	6.3	81.4	S. Korea	4.1	2.5
Spain	6.0	3.7	Vietnam	4.4	65.3	Italy	3.9	2.4
Vietnam	4.5	2.8	Bangladesh	2.6	42.1	France	3.3	2.0
S. Korea	4.1	2.5	Indonesia	1.9	79.3	Turkey	3.2	2.0
Italy	3.9	2.4	Pakistan	1.9	28.4	Germany	2.4	1.5
Turkey	3.7	2.3	Afghanis.	1.7	51.1	UK	1.5	0.9
France	3.3	2.0	Azerbaijan	1.6	48.0	US	1.3	0.8
Bangladesh	2.7	1.7	Ecuador	1.4	42.7	Brazil	1.1	0.8
Germany	2.4	1.5	Morocco	1.4	70.7	Canada	1.0	0.6
Indonesia	2.2	1.4	Peru	1.3	91.7	Australia	0.9	0.5
Pakistan	2.1	1.3	Sri Lanka	1.2	65.3	Sweden	0.7	0.4
Azerbaijan	2.1	1.3	Nigeria	1.2	65.6	Portugal	0.7	0.4

Source: Authors, based on the database compiled from MDB sources.

Therefore, contracts awarded to the local subsidiaries of multinational firms are recorded in the country of the subsidiary and not in the country of the parent firm. Second, MDB procurement policies do not require disclosing how consortium or joint venture members divide the award. Thus, the full amount of the contract is recorded as being awarded to the country of the leading firm, and no amount is recorded to the other participating firms of the consortium or joint venture. Since most MDBs do not disaggregate the contracts awarded to a joint venture, it is not possible to fully observe the skew caused in the database. The data published by the ADB allow us to conclude for 2017, as a proxy, that while 33.5% of all contracts were awarded to joint ventures, only 3.5% of all contracts were awarded to joint ventures of firms from different countries, mainly associated with consulting services. This finding provides some assurance that the skew in the conclusions presented in this study, assessing domestic firms versus international firms, is not high. Finally, MDB procurement policies do not require disclosing how firms subcontract to other firms. Consequently, no contract is recorded as being awarded to subcontracting firms. No MDB published procurement information on subcontracting.

3.2 | Methodology

We estimate an adjusted gravity model to inquire about the factors influencing the amount of MDB-financed public procurement awarded to firms in a country. Implicit in this method is the assumption that the lower the distance between the country of registration of the bidding firm and the country of implementation of the project, the higher the likelihood of the bidding firm being successful. Therefore, distance is a proxy for transaction costs and cultural divergence.

The gravity model for MDB-financed public procurement has the following specification:

$$\boldsymbol{Proc}_{bpst} = exp\left[\log\left(\mathbf{x}_{bpst}\right)\boldsymbol{\beta} + \mathbf{z}_{bpst}\boldsymbol{\gamma} + \lambda_t\right] + u_{bpst} \quad (1)$$

where (i) $\boldsymbol{Proc}_{bpst}$ is the procurement financed by MDB b to country p that is awarded to firms in country s at time t (therefore, we have panel data where the unit is the triplet resulting from the combination of the country pair with the MDB, that is, the combination bps); (ii) $\mathbf{x}_{bpst}$ is a vector with k independent variables, including the distance between the capitals of country p and country s, as proxies for the economic centres of those countries; $\boldsymbol{\beta}$ are elasticities; (iii) $\mathbf{z}_{bpst}$ is a vector of time-specific, MDB-specific, country-specific and country pair-specific fixed effects; $\boldsymbol{\gamma}$ are semi-elasticities; and (iv) u_{bpst} is an error term with conditional mean equal to zero.

Methodologically, Santos Silva and Tenreyro (2006) noted that estimating expected trade based on an OLS log-linear gravity model might suffer from important biases. Therefore, as suggested by these authors, we estimate the expected procurement with a Poisson pseudo-maximum likelihood (PPML) estimator with robust covariances to control for the typical misspecification of this type of estimator. We calculated confidence intervals for procurement potential using the delta method for inference purposes.

3.3 | Variables and data

Table 3 lists the variables tested, their definitions and the sources used. In addition to distance, we tested the explanatory variables typically found in gravity models: population, income and common language. Other explanatory variables typically found in trade gravity models, such as preferential trade relations and exchange rates, are not applied here. In the case of preferential trade agreements, MDBs promote universal access to procurement. The MDBs' currency of transactions is the US dollar. Dummy variables were introduced to control for fixed effects for (i) MDB; (ii) year; (iii) country income classification, as per World Bank (2020), that is, low-, lower-middle, upper-middle or high-income; (iv) country borrowing classification, as per World Bank (2020), that is, IDA, blend or IBRD; and (v) having borrowing status at any of the MDBs considered. We also tested the statistical significance of the 'ease of

TABLE 3 List of variables.

Variable	Definition	Source
Dependent variable		
LPROC*b*,*p*,*s*,*t*	Volume of public procurement financed by the MDB *b* (*bank*) to country *p* (*partner*), measured in US dollars, awarded in the year *t* to the firms of country *s* (*supplier*).	Database compiled by the authors
Independent variables		
LGDP*p*,*t*	Gross domestic product (GDP) of the country of implementation of the MDB-financed contract, i.e., of the country *p*, measured at current US dollars, in year *t*	World Bank (2019b)
LGDP*s*,*t*	GDP of the country of legal residence of the firms awarded, i.e., of the country *s*, measured at current US dollars, in year *t*	World Bank (2019b)
POP*p*,*t* and POP*s*,*t*	Population of the country *p* (or *s*, respectively) in year *t*	World Bank (2019c)
DISTW*s*,*p*	The absolute distance between the capitals of country *s* and country *p*, i.e., the weighted city-level distance between those two countries, as presented by CEPII GeoDist database, in kilometres	Mayer and Zignago (2011)
DOING*p*,*t* and DOING*s*,*t*	Value of the 'Ease of doing business' score (DB17, DB15 or DB12–14, as applicable) for the country *p* (or *s*, respectively) in year t, from 1 to 100. For example, an 'Ease of doing business' score of 75 in Doing Business 2017 (DB-17) means an economy was 25 percentage points away from the best regulatory performance constructed across all economies and time.	IFC (2019)
UN*p*,*s*,*t*	Value of the 'UN Similarity Index', defined as the voting similarity index between country *p* and country *s* in the UN General Assembly of year *t*, from 1 (zero same decisions in all votings of the UN General Assembly of that year) to 100 (same decision in all votings of the UN General Assembly of that year).	'AGREE' variable in Bailey et al. (2017)
Fixed effects		
Y*2013*, Y*2014*, Y*2015*, Y*2016*, Y*2017*	Dummy variables taking value 1 if the MDB-financed contract was awarded that year, taking 0 otherwise. In estimations, the base year is 2012.	n.a.
ADB*p*,*s*,*t*, IDB*p*,*s*,*t*, AFB*p*,*s*,*t*	Dummy variables taking value 1 if the MDB-financed contracts implemented in country *p* and awarded to the firms of country *s* in year *t* were financed by ADB, IADB or AfDB, respectively, taking 0 otherwise. In estimations, the base group is the World Bank.	n.a.
LANG*p*,*s*	Dummy variable taking value 1 if country *p* and country *s* share the same official language, taking 0 otherwise	Mayer and Zignago (2011)
NBRW*s*	Dummy variable taking value 0 if country *s* does not borrow from any of the MDBs considered, taking 1 otherwise.	AfDB (2018); ADB (2018a); EBRD (2018); IADB (2018); World Bank, (2018a)
LMIC*p*, UMIC*p*, HIC*p*, LMIC*s*,	Dummy variables taking value 1 if country *p* (or *s*, respectively) is classified, respectively, as lower-	World Bank (2020)

TABLE 3 (Continued)

Variable	Definition	Source
UMIC*s* and HIC*s*	middle income, upper-middle income or high-income according to their income classification, respectively, taking 0 otherwise. The base group is low-income countries of country *p* or *s*, respectively.	
BLEND*p*, IBRD*p*, BLEND*s* and IBRD*s*	Dummy variables taking value 1 if country *p* (or *s*, respectively) is classified as a blend or IBRD according to their lending classification, respectively, taking 0 otherwise. The base group is IDA*p* or IDA*s*, respectively.	World Bank (2020)

Source: Authors. *i* varies from 2012 to 2017. *b* varies from 1 (AfDB) to 4 (WB). *s* varies across 193 countries. *p* varies across 146 countries. *p* is lower than *s* because MDBs finance only developing economies. Contracts awarded *s* or *p* recorded as 'multinational', 'regional' and 'world' were not included.

doing business score' published by IFC (2019), interpreted as a proxy for a private sector conducive regulatory environment. Finally, we test the statistical significance of the UN General Assembly Voting Similarity Index (Bailey et al., 2017) as a proxy for the good diplomatic relations between the countries of project implementation and the countries of origin of the firms implementing those projects. This variable has often been used empirically as a standard proxy for political allegiance in gravity models but does not inquire about the factors influencing the amount of public procurement financed by MDBs awarded to a country.

Tables 4 and 5 include the descriptive statistics of the variables for both the pooled data and panel data.

Consider that the sample contains panel data. However, this is highly unbalanced panel data because it is natural that the contractual relationship involving the triplet of origin country, destination country and MDB is not realized every year. For our data, in 4364 units (triplets of origin country, destination country and MDB), only 396 units were observed every year from 2012 to 2017, while 1917 units were observed only in one of these years. On average, each unit was observed for 2.4 years.

4 | RESULTS

In this section, we estimate two regressions to shed light on the research question of this study: Does public procurement financed by MDBs benefit local or international firms? We use the coefficients of the two regressions for local and international firms to in-sample calculate the procurement potential, that is, the expected volume of MDB-financed public procurement awarded to the firms of a country, given the model's explanatory variables. We assume that procurement potential depends only on the observable characteristics of the countries. Thus, the difference between actual and potential procurement entirely reflects country-idiosyncratic factors. This allows us to compare countries whose firms obtain more MDB-finance procurement than the model predicts with countries that obtain less, awarded to local and foreign firms, per country, respectively. All the estimation results included in this section were obtained using STATA 17.

4.1 | Testing for structural break between local and foreign firms

We start by answering one important research question of this paper: whether the factors that influence the amount of public procurement awarded to a country are the same (or have the same impact) for local and international firms. To test this hypothesis, we estimate a regression with all observations of the variables in Table 3, including (i) a dummy variable (DOMESTIC) that takes a value of 1 if country *p* is the same as country *s* (procurement awarded to

TABLE 4 Descriptive statistics (pooled data).

Variable	Obs	Mean	SD	Min	Max
PROC*b,p,s*	10 395	1.44E+07	8.33E+07	1.208	2.90E+09
LGDP*p*	10 395	23.963	2.011	17.196	30.128
LGDP*s*	10 395	26.666	2.371	17.196	30.601
LPOP*p*	10 395	16.250	1.968	9.238	21.050
LPOP*s*	10 395	17.247	1.766	9.783	21.050
DISTW*s,p*	10 395	4929.320	4007.354	1	19 648.450
Y2012	10 395	0.175	0.380	0	1
Y2013	10 395	0.176	0.381	0	1
Y2015	10 395	0.169	0.374	0	1
Y2016	10 395	0.162	0.368	0	1
Y2017	10 395	0.142	0.349	0	1
ADB*p,s*	10 395	0.227	0.419	0	1
WDB*p,s*	10 395	0.483	0.500	0	1
IDB*p,s*	10 395	0.147	0.354	0	1
AFB*p,s*	10 395	0.142	0.349	0	1
LANG*p,s*	10 395	0.424	0.494	0	1
NBRW*s*	10 395	0.517	0.500	0	1
LIC*p*	10 395	0.244	0.430	0	1
LMIC*p*	10 395	0.451	0.498	0	1
UMIC*p*	10 395	0.263	0.441	0	1
HIC*p*	10 395	0.041	0.199	0	1
BLEND*p*	10 395	0.125	0.330	0	1
IBRD*p*	10 395	0.381	0.486	0	1
LIC*s*	10 395	0.078	0.267	0	1
LMIC*s*	10 395	0.184	0.388	0	1
UMIC*s*	10 395	0.190	0.392	0	1
HIC*s*	10 395	0.549	0.498	0	1
BLEND*s*	10 395	0.040	0.195	0	1
IBRD*s*	10 395	0.302	0.459	0	1
DOING*s*	10 395	68.336	12.913	20.24	90.87
DOING*p*	10 395	54.478	10.056	20	90.87
UN*p,s*	10 395	78.482	19.577	14.16667	100

Source: Authors.

local firms) and 0 otherwise and (ii) interactions (which are not collinear with the other variables) between DOMESTIC and the independent variables. This regression aims to test for structural breaks between the observations concerning procurement awarded to domestic firms and the group concerning foreign firms.

To build this regression, we make the following four adjustments for the observations of domestically awarded contracts, where country *p* is the same as country *s*. First, distance equals 1 (so that its natural logarithm equals 0). Second, the language dummy variable was equal to 1. Third, all other independent variables are replicated for country *s* with the same value observed for country *p* (e.g., LGDP*s* assume the same value as LGDP*p*). Fourth, the variable 'UN General Assembly voting similarity index' (UN*p,s*) is equal to 100 whenever country *p* is equal to *s*.

TABLE 5 Descriptive statistics (panel data).

Variable		Mean	SD	Min	Max
PROC*b,p,s*	Overall	1.44E+07	8.33E+07	1.208	2.90E+09
	Between		5.21E+07	430.6156	1.38E+09
	Within		3.76E+07	−6.97E+08	1.62E+09
LGDP*p*	Overall	23.963	2.011	17.196	30.128
	Between		1.998	17.196	30.128
	Within		0.215	16.115	28.616
LGDP*s*	Overall	26.666	2.371	17.196	30.601
	Between		2.241	17.196	30.601
	Within		0.164	19.110	30.279
LPOP*p*	Overall	16.250	1.968	9.238	21.050
	Between		1.959	9.282	21.050
	Within		0.059	14.223	18.227
LPOP*s*	Overall	17.247	1.766	9.783	21.050
	Between		1.712	9.785	21.050
	Within		0.133	15.214	19.258
DISTW*s,p*	Overall	4929.320	4007.354	1	19 648.450
	Between		4016.808	1	19 648.450
	Within		176.662	−1509.290	12 317.140
Y2012	Overall	0.175	0.380	0	1
	Between		0.289	0	1
	Within		0.315	−0.325	1.008
Y2013	Overall	0.176	0.381	0	1
	Between		0.279	0	1
	Within		0.320	−0.324	1.009
Y2015	Overall	0.169	0.374	0	1
	Between		0.281	0	1
	Within		0.3127017	−0.331	1.002
Y2016	Overall	0.162	0.368	0	1
	Between		0.269	0	1
	Within		0.309	−0.338	0.995
Y2017	Overall	0.142	0.349	0	1
	Between		0.271	0	1
	Within		0.285	−0.358	0.975
ADB*p,s*	Overall	0.227	0.419	0	1
	Between		0.389	0	1
	Within		0	0.227	0.227
WDB*p,s*	Overall	0.483	0.500	0	1
	Between		0.499	0	1
	Within		0	0.483	0.483

(Continues)

TABLE 5 (Continued)

Variable		Mean	SD	Min	Max
IDB*p,s*	Overall	0.147	0.354	0	1
	Between		0.327	0	1
	Within		0	0.147	0.147
AFB*p,s*	Overall	0.142	0.349	0	1
	Between		0.370	0	1
	Within		0	0.142	0.142
LANG*p,s*	Overall	0.424	0.494	0	1
	Between		0.474	0	1
	Within		0.013	−0.243	0.924
NBRW*s*	Overall	0.517	0.500	0	1
	Between		0.499	0	1
	Within		0.024	−0.283	1.267
LIC*p*	Overall	0.244	0.430	0	1
	Between		0.435	0	1
	Within		0.022	−0.506	1.044
LMIC*p*	Overall	0.451	0.498	0	1
	Between		0.495	0	1
	Within		0.022	−0.299	1.118
UMIC*p*	Overall	0.263	0.441	0	1
	Between		0.444	0	1
	Within		0.024	−0.537	1.013
HIC*p*	Overall	0.041	0.199	0	1
	Between		0.203	0	1
	Within		0	0.041	0.041
BLEND*p*	Overall	0.125	0.330	0	1
	Between		0.331	0	1
	Within		0.011	−0.542	0.791
IBRD*p*	Overall	0.381	0.486	0	1
	Between		0.485	0	1
	Within		0.021	−0.419	1.131
LIC*s*	Overall	0.078	0.267	0	1
	Between		0.270	0	1
	Within		0.013	−0.672	0.578
LMIC*s*	Overall	0.184	0.388	0	1
	Between		0.380	0	1
	Within		0.017	−0.316	0.851
UMIC*s*	Overall	0.190	0.392	0	1
	Between		0.391	0	1
	Within		0.018	−0.560	0.990

TABLE 5 (Continued)

Variable		Mean	SD	Min	Max
HIC*s*	Overall	0.549	0.498	0	1
	Between		0.496	0	1
	Within		0.025	−0.251	1.299
BLEND*s*	Overall	0.040	0.195	0	1
	Between		0.194	0	1
	Within		0.008	−0.294	0.706
IBRD*s*	Overall	0.302	0.459	0	1
	Between		0.455	0	1
	Within		0.022	−0.448	1.102
DOING*s*	Overall	68.336	12.913	20.240	90.870
	Between		12.656	20.265	90.870
	Within		1.714	52.056	82.851
DOING*p*	Overall	54.478	10.056	20.000	90.870
	Between		9.948	20.000	90.870
	Within		2.168	33.368	77.000
UN*p*,*s*	Overall	78.482	19.577	14.167	100.000
	Between		17.909	18.478	100.000
	Within		3.911	48.865	108.347
NT = 10 395 *N* = 4364					

Source: Authors.

Given that our aim in this exercise is only to test for structural changes, we focus only on testing the joint statistical significance of the dummy variable DOMESTIC and all its interactions. Table 6 presents the results. We have evidence to reject the null hypothesis that the determinants of the amount of public procurement awarded to a country are the same for local and international firms. We conclude that factors explaining the success of firms in MDB-financed public procurement are different or at least have different impacts when acting abroad or as local firms. Therefore, to analyse procurement, two different regressions should be considered: one explaining procurement awarded to local firms that include only observations where country *p* is equal to country *s* and another explaining procurement awarded to foreign firms (where country *p* is different from country *s*).

4.2 | MDB-financed public procurement awarded to local firms ($p = s$)

First, we present the results of the MDB-financed public procurement model awarded to local firms and estimates of expected procurement per country.

The dependent variable in the first regression is the aggregated amount of procurement awarded to firms in the country. To obtain this, we add the 168 192 contract observations into sets of the same *p*, *s*, *t* and *b*. Then, we disregard those observations where *s* or *p* was recorded as 'multinational', 'regional' or 'world'. We come up with 10 395 country observations: 1290 country observations with $p = s$ and 9105 country observations with $p \neq s$. We keep for the regression in this subsection only the 1290 country observations, where $p = s$.

Table 7 presents the coefficient estimates for the model. As before, we used a simple pooled PPML regression, which assumes that unobserved country heterogeneity does not depend on the observed explanatory variables in

TABLE 6 PPML estimated coefficients of the regression of MDB-financed public procurement contracts awarded (2012–2017) (domestic and foreign firms).

Variables	Coefficient	Variables (cont.)	Coefficient	Variables (cont.)	Coefficient
C	7.098***	*BLENDp*	0.709***	*DOMESTIC*	−0.395
	(1.323)		(0.204)		(1.587)
LGDPp	0.053	*IBRDp*	0.375**	*DOMLGDPp*	0.096
	(0.114)		(0.165)		(0.210)
LGDPs	−0.270***	*NBRWs*	2.992***	*DOMLPOPs*	−0.121
	(0.101)		(0.398)		(0.225)
LPOPp	0.213*	*BLENDs*	0.720**	*DOMADB*	0.233
	(0.126)		(0.291)		(0.166)
LPOPs	0.707***	*IBRDs*	1.504***	*DOMIDB*	2.219***
	(0.115)		(0.212)		(0.279)
LDIST	−0.322***	*DOINGp*	−0.013**	*DOMAFB*	−0.325
	(0.080)		(0.006)		(0.218)
LANG	−0.250*	*DOINGs*	−0.025**	*DOMLMICp*	1.233***
	(0.151)		(0.011)		(0.360)
ADB	−0.123*	*UN*	0.010***	*DOMUMICp*	−0.809
	(0.137)		(0.004)		(0.547)
IDB	−1.085***	*Y2013*	0.198*	*DOMHICp*	0.304
	(0.233)		(0.115)		(0.791)
AFB	−0.239*	*Y2014*	0.133	*DOMBLENDp*	−1.501***
	(0.139)		(0.099)		(0.366)
LMICp	−0.295*	*Y2015*	0.106	*DOMIBRDp*	−1.210***
	(0.154)		(0.115)		(0.324)
UMICp	0.075	*Y2016*	0.038	*DOMNBRWs*	−2.901***
	(0.290)		(0.094)		(0.544)
HICp	0.096	*Y2017*	0.116	*DOMDOINGp*	0.017
	(0.448)		(0.131)		(0.014)
LMICs	−0.502*				
	(0.257)				
UMICs	1.364***				
	(0.322)				
HICs	0.441				
	(0.451)				
Log pseudolikelihood = −1.302e+11 Number of observations: 10 395			LM test for joint significance of DOMESTIC and the interactions: chi2(13) = 190.32 *P* value = 0.00		

Note: PPML stands for pseudo-maximum likelihood. LGDP is the natural logarithm of the GDP. DOMX stands for the interaction dummy variables (interaction between DOMESTIC and X). The DOMLGDPs, DOMLPOPp, DOMLDIST, DOMLANG, DOMLMICs, DOMUMICs, DOMHICPs, DOMBLENDs, DOMIBRDs, DOMDOINGs and DOMUN were omitted because of collinearity. This does not affect the result, but STATA shows them as 'omitted'. Robust standard errors are between brackets. Estimations were performed using STATA version 17. We tested the joint statistical significance of DOMESTIC and its respective interactions. Our LM test concluded that we should reject one regression to explain observations from procurement awarded to local firms, together with that of foreign firms.

***Stands for statistical significance at 1% significance level.

**Stands for statistical significance at 5% significance level.

*Stands for statistical significance at 10% significance level.
Source: Authors' database.

TABLE 7 PPML estimated coefficients of the regression of MDB-financed public procurement contracts awarded to domestic firms ($p = s$) (2012–2017).

Variables	General regression	Restricted regression	Variables (cont.)	General regression	Restricted regression
C	−11.7497***	−11.6819***	*Y2016*	0.0108	
	(1.8132)	(1.4989)		(0.1193)	
LGDP	0.6677***	0.6936***	*Y2017*	−0.1720*	−0.2327***
	(0.0646)	(0.0592)		(0.0953)	(0.0872)
ADB	0.2114		*NBRW*	−0.7080	
	(0.1431)			(0.6313)	
AFB	−0.6244**	−0.6642**	*LMIC*	−0.2037	
	(0.3151)	(0.3094)		(0.2689)	
IDB	0.9951***	0.9641***	*UMIC*	−0.9113***	−0.7381**
	(0.2209)	(0.2137)		(0.4484)	(0.3315)
Y2013	0.1740		*HIC*	−1.0776*	−0.9344*
	(0.1385)			(0.5984)	(0.4919)
Y2014	0.0332		*BLEND*	−0.2891	−0.4931*
	(0.1103)			(0.2712)	(0.2794)
Y2015	0.0383		*IBRD*	0.2573	
	(0.1570)			(0.3409)	
			DOING	−0.0256*	−0.0238*
				(0.0149)	(0.0136)
loglikelihood	−45 204.17	−45 827.79	R^2	0.6894	0.6839
			n	1290	1290

Note: PPML stands for pseudo-maximum likelihood. LGDP is the natural logarithm of the GDP. The dependent variable is procurement from country *p* to MBD *b* at time *t*. Standard errors are in brackets. Standard errors are cluster-robust (137 clusters) to correct from the country within the autocorrelation. *R*-squared is calculated as the square of the empirical correlation coefficient between the observed and fitted procurement. Estimations were performed using STATA version 16.
***Stands for statistical significance at 1% significance level.
**Stands for statistical significance at 5% significance level.
*Stands for statistical significance at 10% significance level.
Source: Authors' database.

the model. The standard errors are robust. The LPOP and LGDP variables showed a correlation coefficient of 0.86, indicating multicollinearity problems. Therefore, we opted to discard LPOP from the regression analysis. The results show that the coefficient estimate of the GDP is statistically significant and positive. This is consistent with the results of the gravity models. Population was introduced in the model in preliminary estimations, but it caused collinearity problems with GDP, and consequently, we decided to drop it from the regression.

The authors note five other main findings. First, the coefficient of the IADB dummy is positive, the coefficient of the AfDB dummy is negative and the coefficient of the ADB dummy is statistically insignificant. This indicates that IADB-financed procurement awarded to local firms is above that awarded to the WB. AfDB-financed procurement awarded to local firms is below that awarded to the WB. Finally, the ADB-financed procurement of local firms is not

different from that of the WB. Regarding IADB, the proportion of contracts awarded to domestic firms between 2012 and 2017 (87%) was much higher than that observed in WB-financed contracts in Latin America (55%).[10] This may be due to the stricter application of the 'domestic preference' rule. This rule allows an MDB to incorporate into a project a margin of preference for the domestic firms of the borrowing country when comparing their bids to those of foreign firms.[11] Williams-Elegbe (2017) indicated that 'MDBs between 1999 and 2009 rarely used domestic preferences'. However, our findings indicate that IADB may have applied it between 2012 and 2017. On the contrary, regarding the AfDB, the proportion of contracts awarded to domestic firms between 2012 and 2017 (35%) is lower than that observed in WB-financed contracts in Africa (48%).[12]

Second, the year dummy 2017 is statistically significant. This indicates that procurement awarded in 2017 to local firms was below that of 2012. This might be related to this year being the first full year of implementation of the reforms of the procurement policy at the WB (in force since 1 July 2016), AfDB (in force since 1 January 2016) and ADB (in force since 1 July 2017). The sign of the estimated coefficient was negative. This finding means that despite delegating more responsibility to borrowing countries in awarding MDB-financed contracts, the reforms reduced the preference for domestic firms in MDB-financed procurement. This conclusion contradicts Pallas and Wood (2009, p. 228), who were concerned with the fact that the 2008 procurement policy review of the WB had the 'potential to allow widespread misappropriation'. Additional analyses after 2017 are needed to confirm this finding.

Third, the coefficients of the dummy variables for HICs and UMICs are statistically significant and negative. This implies that procurement awarded to local firms in HICs and UMICs is below that awarded in LICs. This finding confirms that domestic preference is applied by MDBs, favouring firms in poorer countries. This conclusion is in accordance with these banks' development mandates.

Fourth, the dummy variable for blended countries (BLEND)[13] is statistically significant, and its coefficient is negative. This implies that the procurement awarded to local firms in blended countries is below that awarded to local firms in IDA-only countries. Local firms begin operating in an environment without international firms. Later, the development of the domestic market incentivized international firms to join the market, and as a result, the relative space of domestic firms decreased.

Finally, the 'Ease of doing business' score (DOING) is statistically significant with a negative coefficient. It implies that the MDB-financed contracts awarded to local firms increases when the 'Ease of doing business' score decreases (lower DOING). We speculate that this can be explained by the relative absence of foreign players in poorer countries, thus favouring domestic firms.

Using the regression coefficients above, we calculated the expected procurement of local firms per country. This is the in-sample predicted value of the MDB-financed contracts awarded in a developing country. We then compare this expected procurement for local firms with the observed value.

Table 8 presents the results. Let us consider Mexico as an example: According to the model, the expected amount procured by MDB-financed projects that Mexican firms should have been awarded locally during the period was USD 640.0 million annually. Instead, they were awarded only USD 55.7 million. Mexican firms appear to be losing their local projects. Most of this difference is predicted in the contracts awarded by the IADB (USD 438 million). On the other hand, Chinese firms were awarded locally above predictions in the WB (USD 58.1 million) but below the ADB (−USD 126.7 million).

4.3 | MDB-financed public procurement awarded to foreign firms ($p \neq s$)

Here, we estimate a model for MDB-financed public procurement awarded to foreign firms. We also estimated the expected procurement of foreign firms for each pair of countries.

The dependent variable of the aforementioned model is the amount of procurement awarded to foreign firms. We added 168 763 contract observations into sets of the same *p*, *s*, *t* and *b*. Then we disregard those observations

TABLE 8 Expected value of MDB-financed public procurement awarded to local firms of country *p*, with 95% confidence intervals (USD million, annual average from 2012 to 2017).

Country *p*	Observed procurement (1)	Expected (2)	Expected *low* (3)	Expected *high* (4)	Expected higher/lower than actual procurement: Absolute difference (2)-(1)	Ratio, as % (2)/(1)	MDB with largest difference
Mexico	55.7	640.0	311.3	968.8	**584.3**	11.5	IADB (438.0)
Indonesia	320.7	764.0	337.3	1,190.8	**443.3**	2.4	ADB (291.0)
Venezuela	131.3	456.7	151.6	761.8	**325.4**	3.5	WB (325.4)
Thailand	12.3	332.2	99.2	565.2	**320.0**	27.1	WB (165.5)
Philippines	84.7	391.3	222.4	560.1	**306.6**	4.6	ADB (174.0)
Angola	31.1	233.2	111.9	354.5	**202.1**	7.5	WB (130.4)
Colombia	84.0	278.3	136.3	420.2	**194.2**	3.3	IADB (176.9)
Myanmar	16.6	185.1	107.1	263.2	**168.5**	11.1	ADB (88.6)
Egypt	129.4	289.2	137.4	441.1	**159.8**	2.2	AfDB (81.7)
Chile	20.7	178.6	34.2	323.0	**157.9**	8.6	IADB (108.2)
China	2023.6	1955.0	1444.0	2465.9	−**68.7**	1.0	ADB (−126.7)
Morocco	233.8	116.1	47.5	184.8	−**117.2**	0.4	AfDB (−170.3)
Kenya	191.3	60.0	25.3	94.6	−**131.3**	0.3	WB (−87.6)
Sri Lanka	202.0	69.5	36.3	102.7	−**132.5**	0.3	ADB (−137.6)
Tunisia	210.6	63.8	25.1	102.4	−**146.8**	0.3	AfDB (−83.3)
Afghanistan	286.3	88.3	50.2	126.3	−**198.0**	0.3	WB (−187.5)
Azerbaijan	266.3	48.8	22.5	75.2	−**217.5**	0.2	WB (−156.1)
Brazil	1583.4	1351.9	804.7	1899.1	−**231.5**	0.9	IADB (−315.2)
Vietnam	725.2	252.0	135.3	368.7	−**473.2**	0.3	WB (−270.5)
Argentina	1,052.7	17.3	311.2	723.4	−**535.4**	0.5	IADB (−332.0)
India	2598.0	1628.0	664.7	2591.3	−**969.9**	0.6	WB (−569.3)

Note: Selected cases are as follows: (i) the 10 highest positive differences, (ii) the specific case of China and (iii) the 10 highest negative differences. Remaining (75) countries with positive differences are Algeria (USD 131m); Nigeria (USD 114m); Russia (USD 114m); Ethiopia (USD 92m); Kazakhstan (USD 92m); Turkey (USD 79m); Iraq (USD 75m); Ukraine (USD 66m); South Africa (USD 64m); Malaysia (USD 56m); Guatemala (USD 49m); Chad and Dominican Republic (USD 44m, each); El Salvador (USD 43m); Bolivia (USD 42m); Côte d'Ivoire (USD 38m); Uzbekistan (USD 32m); Romania (USD 31m); Ghana and Zimbabwe (USD 30m, each); Guinea (USD 26m); Tajikistan and Tanzania (USD 24m, each); Trinidad and Tobago (USD 23m); Cameroon (USD 22m); Gabon (USD 20m); Laos (USD 18m); Jordan (USD 16m); Benin, Mauritania and Palestine (USD 15m, each); Bahamas and Timor-Leste (USD 14m, each); Madagascar (USD 13m); Sudan and Republic of Congo (USD 12m, each); Yemen, Lebanon and Kyrgyz Republic (11m, each); Zambia, Jamaica, Eritrea, Central African Republic and Suriname (USD 10m); Bulgaria, Togo and Sierra Leone (USD 9m); Burundi, Haiti, Equatorial Guinea and Maldives (USD 8m, each); Guinea-Bissau and Barbados (USD 6m, each); Botswana, Bhutan and Djibouti (USD 5m, each); Micronesia and Comoros (USD 4m, each); Lesotho, Rwanda, Solomon Islands, Mauritius and Vanuatu (USD 3m, each); Kiribati, São Tomé and Príncipe and Antigua and Barbuda (USD 2m, each); Gambia and Namibia (USD 1m, each); and Seychelles, Moldova, Grenada, Marshall Islands, Palau and St. Lucia (less than USD 1m, each). Remaining (41) countries with negative differences are Paraguay (-USD 114m); Ecuador (-USD 87m), Panama (-USD 80m); Pakistan (-USD 75m); Montenegro (-USD 55m); Costa Rica (-USD 54m); Georgia (-USD 53m); Armenia (-USD 52m); Nepal (-USD 48m); Bangladesh (-USD 47m); Poland (-USD 43m); Belarus and Uruguay (-USD 39m, each); Eswatini, Nicaragua and Malawi (-USD 32m, each); Senegal (-USD 29m); Peru (-USD 24m); Uganda (-USD 23m); Croatia and Mali (-USD 17m, each); Cambodia and North Macedonia (-USD 13m, each); Niger and Democratic Republic of Congo (-USD 11m, each); Papua New Guinea (-USD 10m); Mozambique

(-USD 5m); Honduras, Samoa and Burkina Faso (-USD 4m, each); Bosnia and Herzegovina, Albania, Mongolia and Tonga (-USD 3m, each); Cape Verde (-USD 2m); Fiji and Guyana (-USD 1m, each); and St. Vincent and Grenadines, Belize, Liberia and Dominica (less than –USD 1m, each). The table also presents the upper and lower limits of the 95% confidence intervals of procurement potential obtained using the delta method. Additional detailed data are available upon request.
Source: Authors' estimates based on the authors' database.

where *s* or *p* was recorded as 'multinational', 'regional' or 'world', and we finally consider only those cases where $p \neq s$. We obtain 9105 country observations.

Table 9 presents the estimation results of this model. We again used a simple pooled PPML regression with robust standard errors. The explanatory variables normally found to be statistically significant in gravity models were also included in our model. Again, due to multicollinearity issues referred to in the last subsection between LGDPp and LPOPp, the latter was excluded from the initial estimation. The results show that the estimated effects of LGDP*p* and LGDP*s* are statistically significant, with the first positive and the second negative. This finding has already been observed in Table 6. Controlling the size gravity effect of a given country by its population, the MDB-backed procurement benefits on average foreign firms of low- and middle-income countries rather than those of higher-income countries. This is in accordance with the development mandate for MDBs. The coefficient of LPOP*s* is statistically significant and positive.[14] Distance has a negative impact and is statistically significant. This is consistent with the results of the gravity models. Counterintuitively, having a common language is negative, but it becomes statistically insignificant in the restricted model. This is possibly explained by the fact that bidding for MDB-financed tenders is made in English, so having a common language is relatively unimportant.

The authors note four other main findings. First, the signs obtained for the effects of other explanatory variables are the opposite of those observed for the procurement awarded to local firms; namely, the coefficient of the IADB dummy becomes negative, while that of the BLEND dummies becomes positive. This is expected. If the IADB-financed procurement awarded to local firms was above that of the WB, one could expect that the IADB-financed procurement awarded to foreign firms would be below that of the WB. Similarly, if MDB-financed procurement awarded to local firms in BLEND countries was below that observed in IDA countries because of the lower competition of foreign firms, one could expect that MDB-financed procurement awarded to foreign firms in BLEND countries is higher than that observed in IDA countries.

Second, the 'Ease of doing business' score (both DOING*s* and DOING*p*) remains negative. This implies that MDB-financed contracts awarded to foreign firms decrease when the 'Ease of doing business' score of the firm or the country of the project increases (higher DOING). This finding confirms local firms' domestic preferences in developing countries.

Third, the 'UN General Assembly voting similarity index' (Bailey et al., 2017) is statistically significant, and its coefficient is positive. This means that good diplomatic relations between the country of implementation of the project and the country of origin of the firm implementing the projects positively impact the volume of contracts for MDB-financed procurement awarded to a certain country. This is one of the key findings of the present study.

Finally, the UMIC*s*, IBRD*s*, NBRW*s* and BLEND*s* dummies show positive coefficients, while the LMIC*s* dummy shows negative coefficients. This leads us to conclude that MDB-financed procurement contracts awarded abroad (a) to firms registered in UMICs is higher than that awarded to firms registered in LICs; (b) to firms registered in countries that borrow from the IBRD is higher than that awarded to firms registered in IDA-only countries; (c) firms registered in countries that do not borrow from MDBs are higher than those awarded to firms registered in countries that borrow from these banks; (d) firms registered in blend countries are higher than those awarded to firms registered in IDA-only countries; and (e) to firms registered in lower-middle-income countries is lower than that awarded to firms registered in LICs. This combination of results confirms that firms in low and lower-middle-income countries are not as competitive beyond their borders as they are locally. This is probably due to their relatively low knowledge of procurement and capacity to compete. Likewise, firms in UMICs have acquired skills to compete with firms in developed countries in other markets.

TABLE 9 PPML estimated coefficients of the regression of MDB-financed public procurement contracts awarded to foreign firms ($p \neq s$) (2012–2017).

Variables	General model	Restricted model	Variables (cont.)	General model	Restricted model	Variables (cont.)	General model	Restricted model
C	5.778***	4.981***	*LMICp*	−0.470***	−0.301***	*IBRDs*	1.560***	1.710***
	(1.418)	(1.281)		(0.116)	(0.105)		(0.207)	(0.229)
LGDPp	0.261***	0.277***	*UMICp*	−0.308		*DOINGp*	−0.017***	−0.015***
	(0.032)	(0.023)		(0.218)			(0.005)	(0.004)
LGDPs	−0.244**	−0.222**	*HICp*	−0.404		*DOINGs*	−0.030***	−0.031***
	(0.100)	(0.096)		(0.327)			(0.011)	(0.011)
LPOPs	0.683***	0.673***	*LMICs*	−0.536**	−0.775***	*UN*	0.011***	0.011***
	(0.113)	(0.107)		(0.256)	(0.229)		(0.004)	(0.004)
LDIST	−0.319***	−0.317***	*UMICs*	1.329***	1.122***	*Y2013*	0.185	
	(0.079)	(0.072)		(0.319)	(0.231)		(0.143)	
LANG	−0.247*		*HICs*	0.429		*Y2014*	0.202	
	(0.150)			(0.448)			(0.147)	
ADB	−0.121		*BLENDp*	0.657***	0.474**	*Y2015*	0.231	
	(0.137)			(0.190)	(0.197)		(0.201)	
IDB	−1.138***	−1.196***	*IBRDp*	0.307*		*Y2016*	0.131	
	(0.233)	(0.203)		(0.167)			(0.136)	
AFB	−0.254*	−0.222*	*NBRWs*	3.062***	3.429***	*Y2017*	0.513**	0.350*
	(0.140)	(0.125)		(0.376)	(0.363)		(0.224)	(0.201)
			BLENDs	0.749***	0.938***	Test LM: Restricted vs. General chi2(10) = 12.60 *P* value = 0.247		
				(0.291)	(0.327)			
Pseudo-loglikelihood	−9.05E10	−9.05 E10	*N*	9105	9105	R^2	0.294	0.309

Note: PPML stands for pseudo-maximum likelihood, where L represents the natural logarithm. The dependent variable is PROC*b,p,s,t* with $p \neq s$. Robust standard errors between brackets. *R*-squared is calculated as the square of the empirical correlation coefficient between the observed and fitted procurement. The LM statistic tests the restricted model against a general model. When the statistically insignificant variables were dropped from the general model, *LANG* and *IBRDp* became statistically insignificant; therefore, they were not considered in the restricted model.

***Stands for statistical significance at 1%.

**Stands for statistical significance at 5%.

*Stands for statistical significance at 10%.

Source: Authors' database.

TABLE 10 Potential for MDB-financed public procurement awarded to foreign firms of country *s*, with 95% confidence intervals (annual average from 2012 to 2017, USD million).

Country *s*	Observed procurement (1)	Expected (2)	Expected *low* (3)	Expected *high* (4)	Expected higher/lower than actual procurement: Absolute difference (2)-(1)	Ratio (2)/(1)	MDB with largest difference
United States	192.6	561.2	365.3	757.2	**368.6**	2.91	WB (189.1)/ADB (121.4)
United Kingdom	228.7	429.2	291.6	566.8	**200.5**	1.88	WB (84.5)/ADB (75.4)
Japan	108.4	296.9	200.0	393.8	**188.5**	2.74	ADB (152.9)
Germany	316.1	503.7	355.2	652.1	**187.6**	1.59	WB (133.9)
South Africa	29.6	155.7	101.8	209.6	**126.1**	5.26	WB (84.9)
Sri Lanka	7.0	121.4	78.3	164.4	**114.4**	17.37	ADB (94.7)
Canada	101.7	189.8	126.5	253.1	**88.1**	1.87	ADB (47.5)
Argentina	5.9	92.8	52.0	133.6	**86.9**	15.66	IADB (55.4)
France	443.3	518.3	353.5	683.1	**75.0**	1.17	ADB (59.2)/IADB (−30.4)
Philippines	16.7	90.5	60.2	120.7	**73.7**	5.40	ADB (60.2)
Brazil	189.1	218.1	136.3	299.9	**29.0**	1.15	IADB (53.2)/WB (−39.0)
India	666.6	643.9	434.8	853.0	**−22.7**	0.97	WB(−21.9)/AfDB (−16.5)
Dominican Rep.	48.1	13.4	7.7	19.1	**−34.7**	0.28	IADB (−40.5)
Portugal	99.2	51.5	31.6	71.5	**−47.6**	0.52	WB (−35.6)/AfDB (−21.8)
Azerbaijan	81.6	25.0	14.2	35.7	**−56.6**	0.31	ADB (−35.1)/WB (−21.5)
Denmark	98.1	39.2	25.9	52.5	**−58.9**	0.40	WB (−33.9)/AfDB (−31.9)
Sweden	112.2	46.7	32.1	61.2	**−65.6**	0.42	ADB (−47.5)
Italy	631.2	483.6	315.9	651.2	**−147.6**	0.77	WB (−162.1)
China	2782.8	2559.2	1623.4	3494.9	**−223.6**	0.92	WB (−128.9)/IADB(−93.8)/
Turkey	533.7	161.9	98.6	225.1	**−371.9**	0.30	ADB (−211.2)/WB (−145.1)
Spain	903.5	442.7	290.0	595.4	**−460.8**	0.49	WB (−369.2)/IADB (−62.4)
South Korea	674.5	176.6	111.5	241.6	**−498.0**	0.26	ADB (−356.5)/WB (−128.0)

Note: Selected cases are shown: (i) the 10 highest positive differences in absolute terms, (ii) the specific cases of India and Brazil and (iii) the 10 highest negative differences in absolute terms. Remaining (85) countries with positive differences (were awarded less than projected) are the Netherlands (USD 60m), Malaysia (USD 48m); Colombia (USD 41m); Mexico (USD 40m); Jordan (USD 34m); Peru (USD 27m); Hungary (USD 25m); Guatemala and Singapore (USD 23m, each); Romania (USD 21m); Switzerland and Ireland (USD 20m, each); Czech Republic, Armenia, Ecuador and Australia (USD 16m, each); Hong Kong (USD 15m); Russia (USD 12m); Lebanon and Slovenia (USD 11m, each); New Zealand and Cameroon (USD 10m, each); Uganda, Albania, Gabon, Bangladesh and Paraguay (USD 7m, each); Nepal, Nigeria, Slovakia, Norway and Viet Nam (USD 6m, each); Ethiopia and Iran (USD 5m, each); Madagascar, Bosnia-Herzegovina, Bolivia, Finland, Georgia, Algeria, Montenegro and Jamaica (USD 4m, each); Niger, Latvia, Lithuania, Oman, Belarus, Namibia and Estonia (USD 3m, each); Mali, Burundi, Mozambique, Taiwan and Burkina Faso (USD 2m, each); and Zimbabwe, Uzbekistan, North Macedonia, Barbados, Tajikistan, Bulgaria, Malawi, Benin, Chile, Mauritius, Rwanda, Angola, Botswana, Bahrain, Haiti, Moldova, Cambodia, Guinea, Qatar, Brunei, Suriname, Nicaragua, Sudan, Mongolia, Kyrgyz Republic, Central African Republic, Liberia, Grenada, Sierra Leone, West Bank and Gaza and Djibouti (less than USD 2m, each). Remaining (52) countries with negative differences (were awarded more than projected) are Greece and Belgium (-USD 28m each); Togo (-USD 18m); Pakistan (-USD 15m); Indonesia (-USD 13m, each); Chad, Tunisia and Austria (-USD 12m, each); Ukraine (-USD 9m); Egypt and Senegal (-USD 7m, each); Kazakhstan and El Salvador (-USD 6m, each); Thailand and Yemen (-USD 5m, each); Poland, Venezuela, Tanzania, Eswatini and Iceland (-USD 3m, each); Morocco, Kuwait, Fiji, Panama, Mauritania, Israel, Costa Rica and Kenya (-USD 2m, each); and Uruguay, Saudi Arabia, Ghana, Côte d'Ivoire, United Arab Emirates, Cyprus, Zambia, Republic of

Congo, Laos, Afghanistan, St Lucia, The Gambia, Myanmar, Croatia, Tonga, Solomon Islands, Trinidad and Tobago, Honduras, Vanuatu, Dominica, Papua New Guinea, Cape Verde, Bhutan, Lesotho and Maldives (less than -USD 2m, each). The table also presents the upper and lower limits of the 95% confidence intervals of procurement potential obtained using the delta method. Additional detailed data are available upon request.

Source: Authors' estimates based on the authors' database.

Using the coefficients of the regression above, we estimate the expected procurement awarded to foreign firms per country. This is the in-sample predicted value of MDB-financed contracts awarded to foreign firms in a developing country. We then compare the observed value of the procurement potential awarded to foreign firms.

Table 10 presents the results. Consider Turkey as an example. According to the model, Turkish firms should have been awarded USD 161.9 million annually for contracts obtained outside Turkey. Instead, they were awarded USD 533.7 million. This higher-than-predicted result was obtained mainly from the procurement of the ADB (USD 211.2 million above prediction annually). For China, Chinese firms were awarded a higher-than-predicted amount when operating abroad in the WB (USD 128.9 million more annually), in the IADB (USD 93.8 million) and in the AfDB (USD 16.6 million) but a lower-than-predicted amount when operating abroad in the ADB (USD 15.6 million less annually).

Finally, using the coefficients of the regression above, we calculate the expected procurement awarded to foreign firms per pair of countries. We then compare the expected procurement awarded to foreign firms with the observed value.

Table 11 presents the results. We found significant discrepancies between the predicted and actual MDB-financed public procurement awarded to certain pairs of countries, particularly those involving Chinese firms or Chinese projects. For instance, the volume awarded to Chinese firms in India is one-sixth of the predicted amount. The volume awarded to Indian firms in China is virtually zero, whereas the model predicts USD 46.9 million annually. In addition, the volumes awarded to Chinese firms in Pakistan, Kenya, Ethiopia and Venezuela are between two and three times higher than predicted volumes (17 times higher in Venezuela). One explanation for the results is the quality of Chinese diplomatic relations with these countries. Chinese State-Owned Enterprises are regular bidders and winners in MDB-financed procurement contracts. Chinese provincial governments are the executing and implementing agencies of most of the projects that the MDB finances in China. By definition, firms and institutions have political links. Diplomatic relations can also affect the preparation of tenders by firms. For instance, Chinese firms and consultants refrain from bidding for projects in India because of the difficulties in obtaining visas for their nationals and vice-versa.

Globally, the success of Chinese firms in MDB-backed procurement in countries such as Pakistan, Kenya, Ethiopia and Venezuela should be seen in the context of existing empirical work on the rise of China and its efforts to improve its position in the world through aid, investment and diplomatic ties (Gu et al., 2016; Kilama, 2015; Lei & Sui, 2022; Norris, 2016). Our findings on the presence of Chinese firms in the MDB-backed procurement of these countries are consistent with the strength of China's efforts in global public diplomacy, as defined by Hartig (2016), in the same countries, as described by Aid Data (2023). This database compiles publicly available data on China's Global Public Diplomacy, disaggregated into financial, cultural, elite-to-elite, exchange, informational diplomacy and leaders' perceptions of China.

Finally, the volume of contracts awarded to Japanese, US, Italian, UK, French or German firms in China is between one and one-fifth of the amount predicted. This should be seen as a measure of protectionism in MDB-backed procurement in the Chinese domestic market, consistent with Chinese domestic protectionism in other markets, as Wang (2016) noted. More globally, Hillman (2018) noted how Chinese domestic protectionism has also spread to Chinese global initiatives in third countries, namely, the Belt and Road Initiative.[15]

TABLE 11 Potential for MDB-financed public procurement awarded to foreign firms of country *s* in country *p*, with 95% confidence intervals (USD million, annual average from 2012 to 2017).

Country *p*	Country *s*	Observed procurement (1)	Expected (2)	Expected *low* (3)	Expected *high* (4)	Expected higher/lower than actual procurement: absolute difference (2)-(1)
India	China	26.6	154.7	105.0	204.4	**128.1**
Uzbekistan	China	43.7	154.0	78.9	229.2	**110.4**
Nigeria	China	27.9	115.5	56.2	174.9	**87.7**
China	Japan	5.9	71.2	47.6	94.8	**65.3**
Laos	China	4.9	52.9	39.9	66.0	**48.1**
China	India	0.1	46.9	30.6	63.1	**46.8**
Mongolia	China	24.6	67.4	35.9	98.9	**42.8**
Cambodia	China	14.6	56.4	42.1	70.7	**41.8**
China	United States	8.2	48.8	31.0	66.5	**40.6**
Philippines	China	24.7	63.2	48.4	78.0	**38.6**
Sri Lanka	China	14.3	49.4	32.2	66.6	**35.0**
Madagascar	China	14.2	47.2	32.4	61.9	**33.0**
Angola	Brazil	0.3	31.4	20.5	42.2	**31.1**
China	Italy	0.4	29.9	17.9	42.0	**29.5**
China	United Kingdom	2.8	32.3	22.4	42.2	**29.5**
Angola	China	13.1	41.9	28.9	54.8	**28.7**
China	France	0.6	28.7	18.3	39.0	**28.0**
Bangladesh	Sri Lanka	0.7	25.0	17.8	32.1	**24.3**
China	Germany	7.1	30.2	22.0	38.5	**23.1**
Bangladesh	Japan	4.6	27.5	18.5	26.5	**22.9**
Venezuela	China	79.1	4.6	2.0	7.2	**−74.5**
Kazakhstan	Italy	89.0	14.5	9.9	19.0	**−74.6**
India	South Korea	93.4	13.9	9.0	18.9	**−79.4**
Bangladesh	South Korea	97.4	16.9	10.8	22.9	**−80.6**
Argentina	Italy	94.2	10.6	6.4	14.8	**−83.6**
Ethiopia	China	190.0	81.0	56.0	105.9	**−109.1**
Kenya	China	194.4	83.1	45.6	120.7	**−111.2**
Kazakhstan	Turkey	131.6	12.3	8.1	16.6	**−119.3**
Egypt	Italy	138.5	16.5	11.1	21.9	**−121.9**
Ecuador	Brazil	143.8	11.0	7.0	15.0	**−132.8**
Uzbekistan	South Korea	152.3	15.2	8.8	21.6	**−137.2**
Ecuador	Spain	153.1	3.7	2.2	5.1	**−149.4**
Azerbaijan	Turkey	178.0	25.0	15.8	34.2	**−153.0**
Viet Nam	South Korea	171.5	15.0	9.9	20.2	**−156.4**
Pakistan	China	665.1	220.5	103.6	337.4	**−444.6**

Note: Only the selected pairs of countries are shown: (i) the highest positive difference in absolute terms and (ii) the highest negative difference in absolute terms. The table also presents the upper and lower limits of the 95% confidence intervals of procurement potential obtained using the delta method. Additional detailed data are available upon request.
Source: Authors' estimates based on the authors' database.

5 | CONCLUSIONS

This study contributes to the knowledge gap in the literature on MDB-financed public procurement. The authors compiled data on contracts awarded to firms for implementing projects financed by the AfDB, ADB, IADB and WB, covering 168 192 entries and 193 countries in six consecutive years, from 2012 to 2017. This period is relevant because it captures the increase in countercyclical lending of these banks to developing countries in response to the 2008–2009 global financial crisis and the impact of the reforms of the procurement policies of the MDBs approved from 2008 to 2012. We then used a gravity model to determine the factors influencing the amount of public procurement awarded to a country. We reached five main conclusions:

First, the procurement of MDBs disproportionately benefits firms in developing countries and not those of banks' larger shareholders. MDB-financed procurement contracts awarded to local firms in UMICs are lower than those awarded to LICs. This finding confirms that domestic preference is applied by MDBs, favouring firms in poorer countries.

Second, we find that MDB-financed procurement contracts awarded to UMIC firms in third countries are higher than those awarded to LIC firms. The results show that (a) LIC firms are not as competitive abroad as they are at home and that (b) UMIC firms can compete successfully with firms in developed countries not only locally but also in third-country markets.

These two conclusions are in accordance with the development mandate of the MDBs.

Third, MDBs treat domestic firms differently. The IADB-financed procurement awarded to domestic firms is much higher than that awarded to the WB. The ADB-financed procurement of local firms is not different from that of the WB. Finally, AfDB-financed procurement awarded to local firms is below that awarded to the WB. This could be due to the different applications by MDBs of the 'domestic preference' rule, which incorporates a margin of preference for the domestic firms of the borrowing country when comparing their bids to those of foreign firms.

Fourth, we find that good diplomatic relations matter when awarding contracts. Introducing as a proxy for good diplomatic relations between countries the 'UN General Assembly voting similarity index' (Bailey et al., 2017), we conclude that good diplomatic relations between the country of implementation of the project and the country of origin of the firm implementing the projects have a positive impact on the volume of the contracts of MDB-financed procurement awarded to a certain country.

Fifth, we noted significant discrepancies between the predicted and actual MDB-financed public procurement awarded to specific pairs of countries, particularly those involving Chinese firms or Chinese projects. One explanation for the results is the quality of Chinese diplomatic relations with these countries. This finding corroborates existing empirical work on the rise of China and its efforts to improve its global position through aid, investment and diplomatic ties.

Finally, we would like to carve out some recommendations for future research. On the one hand, the impact of joint ventures and subcontracting in the statistics of MDB-backed procurement deserves further attention. In particular, some works can build datasets on these two aspects. On the other hand, researchers could look into a country-specific analysis of the results presented in this paper, which could be complemented for a specific country by examining the individual contract observations available in the database. One such example is Mexico. Mexican firms are estimated to lose out on local projects, particularly IADB-backed procurement. However, our study also concludes that the IADB favours domestic firms.

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CONFLICT OF INTEREST STATEMENT

One of the authors was member of the Board of Directors of the Asian Development Bank. However, the views expressed in this text are those of the authors and neither reflect the official policy or position of the Asian Development Bank nor the official position of any other organization that the authors may be affiliated with.

DATA AVAILABILITY STATEMENT

The data underlying this study is openly available to other researchers at https://www.repository.utl.pt/handle/10400.5/26203.

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ENDNOTES

[1] This includes the public procurement financed by the African Development Bank (AfDB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development, the Inter-American Development Bank (IADB) and the World Bank (WB) (ADB, 2018a; AfDB, 2018; EBRD, 2018; IADB, 2018; World Bank, 2018a). However, as it does not include the procurement of other major sub-regional multilateral banks, this figure is underestimated.

[2] Namely, AfDB, ADB, IADB, WB, the UN Development Program, the UN Children's Fund, the UN High Commissioner for Refugees and the World Food Program.

[3] For instance, the volume of contracts awarded by the ADB nearly tripled from an annual average of USD 3.7 billion from 2000 to 2010 to USD 9.9 billion from 2012 to 2017. For the World Bank, the observed increase is of nearly 43% in the same period, from USD 9.6 billion to USD 13.7 billion.

[4] In 2008, the AfDB introduced universal procurement for its concessional financing, the African Development Fund. Currently, ADB and the IADB are the only MDBs that continue to tie procurement to member countries for almost all procurement. The WB applies universal procurement. In 2011, the WB commenced a comprehensive review of its procurement policies. It was the first holistic review since the Bank was established. This review increased the Bank's reliance in country procurement systems, including a qualitative factor in the assessment of the proposals, moving away from a transactional approach of compliance checking to a systemic governance approach and promoting capacity building of the domestic procurement systems. All MDBs followed the WB in subsequent years. For example, the review of the ADB procurement regulations occurred in 2012.

[5] See (i) http://search.worldbank.org/api/contractdata (retrieved on 12 January 2021); (ii) https://www.iadb.org/en/projects/project-procurement, label 'Awarded contracts' (retrieved on 12 January 2021); and (iii) https://www.adb.org/projects/tenders/status/awarded-1586 (retrieved on 12 January 2021).

[6] Among the main MDBs, the EBRD did not respond to our request to provide us with information. Nevertheless, we believe its impact on our study is limited, since nearly 85% of the EBRD financing is provided directly to non-sovereign clients, so it does not create competitive procurement opportunities.

[7] Data are truncated at USD 1000 because the MDBs do not publish procurement data awarded below this amount. In addition, we do not consider in this paper the corporate procurement of MDBs, that is, goods, works and services used in its headquarters and field offices to support its operations, since these goods are normally awarded locally.

[8] Namely, Armenia, Bangladesh, Belarus, Brazil, Cambodia, Cameroon, Chad, Comoros, Dem. Rep. Congo, Ethiopia, Fiji, Gabon, Ghana, Kenya, Kyrgyz Rep., Liberia, Madagascar, Maldives, Mongolia, Mozambique, Myanmar, Namibia, Nepal, Nigeria, Pakistan, Papua New Guinea, Philippines, Seychelles, Tajikistan, Tanzania, Timor-Leste, Uganda, Vanuatu, Venezuela, Yemen and Zambia.

[9] Namely, Ethiopia, Gabon, Kenya, Kyrgyz Republic, Liberia, Maldives, Mongolia, Myanmar, Namibia, Pakistan, Papua New Guinea, Seychelles, Tajikistan, Tanzania, Timor-Leste and Vanuatu.

[10] For example, the firms of IADB's largest shareholder, Brazil, were awarded 99% of the bank-financed contracts in their country. This compares to 70% of the contracts in WB-financed contracts. For Argentina and Ecuador, the proportions were 99–60% and 88–8%.

[11] This rule exists in the MDBs to promote the development and industrialization of developing countries. The margin is of 15% in the case of goods for the four MDBs considered in this paper. This margin varies in the case of works: (i) 10% for the AfDB; (ii) 7.5% for both the ADB and the WB; and (iii) none for the IADB (Williams-Elegbe, 2017, pp. 162–167).

[12] For example, the firms of one of AfDB's largest shareholders, South Africa, were awarded 2% of the bank-financed contracts in their country. This compares to 46% of the contracts in WB-financed contracts.

[13] Countries that reach a Gross National Income per capita of USD 1175 (2020 figures, current prices, Atlas method).

[14] LGDP*s* and LPOP*p* are negative and statistically not significant, respectively. The interaction between GDP and POP variables for the same country explains this, due to collinearity problems. This finding occurs often in gravity models.

[15] Hillman (2018) compared the protectionism of the Chinese-backed and MDB-backed procurement. For a sample of 2200 transportation projects in Asia approved between 2006 and 2017, tenders financed by the Chinese government resulted in a proportion of 89% of the firms awarded being Chinese, 8% local and 3% from third countries. In comparison, tenders financed by the World Bank and ADB resulted in a proportion of 29% of the firms being Chinese, 41% local and 30% from third countries.

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APPENDIX A: COUNTRIES INCLUDED IN THE DATASET

A.1 | Countries *p* (number = 146)

Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahamas, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia-Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Cook Islands, Costa Rica, Côte d'Ivoire, Croatia, Democratic Republic of Congo, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Federated States of Micronesia, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kyrgyz Republic, Laos, Lebanon, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Republic of Congo, Romania, Russia, Rwanda, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, Sudan, Suriname, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, West Bank and Gaza, Yemen, Zambia and Zimbabwe.

A.2 | Countries *s* (*n* = 193)

In addition to those listed in A.1. Anguilla, Australia, Austria, Bahrain, Belgium, Brunei, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, New Caledonia, New Zealand, Norway, Oman, Portugal, Puerto Rico, Qatar, Saudi Arabia, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Taiwan, the Netherlands, United Arab Emirates, the United Kingdom and the United States.