Journal of International Money and Finance 130 (2023) 102763

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

National development banks and loan contract terms: Evidence from syndicated loans

Di Gong [c,d], Jiajun Xu [b,*], Jianye Yan [a,b]

[a] College of Economics and Management, China Agricultural University, PR China
[b] Institute of New Structural Economics, National School of Development, Peking University, PR China
[c] School of Banking and Finance, University of International Business and Economics, PR China
[d] Academy of Mathematics and Systems Science, Chinese Academy of Sciences, PR China

ARTICLE INFO

Article history:
Available online 30 October 2022

JEL Classification:
F34
G21
O20

Keywords:
National development banks
Syndicated loans
Contract terms

ABSTRACT

In this study, we examine whether national development banks (NDBs) fill market gaps in the syndicated loan market. Existing theories make conflicting arguments, but little empirical research has systematically investigated the roles of NDBs in credit markets. To fill the gap, we build a novel and comprehensive list of NDBs worldwide. Using a large, international sample of non-sovereign syndicated loans over the past two decades, we find that loans with NDBs have longer maturity and higher loan spreads than those without. These results hold using the propensity score matching technique and the treatment effects model that account for the endogenous selection of NDBs. We also find that NDBs provide financial support for credit-rationed borrowers and play a countercyclical role during global liquidity cycles. Our study implies that NDBs address market failures in the syndicated loan market.

1. Introduction

Private commercial banking systems often suffer from market failures such as short-termism, risk aversion, and procyclical lending. To proactively address these market failures, governments have created national development banks (NDBs). In contrast with profit-maximizing commercial banks, NDBs are specialized financial institutions with the official mandate to fulfill public policy objectives. The world is witnessing a renaissance of NDBs. Advanced and developing countries alike, such as the United Kingdom, the United States, Nigeria, Ghana, and Nepal, have recently established or are planning to build new NDBs to meet economic, social, and environmental development challenges (Xu et al., 2019, 2021a).

Despite the growing practical significance of NDBs, little empirical research has systematically examined whether NDBs fill market gaps in credit markets.[1] Competing theoretical views have resulted in unsettled debates. On the one hand, the development view maintains that NDBs can address market failures by providing long-term and high-risk capital that commercial banks fail to offer and play a countercyclical role in times of crises. On the other hand, however, the political view contends

* Corresponding author at: Langrun Garden 165, Peking University, Yiheyuan Road No. 5, Beijing 100871, PR China.
E-mail address: jiajunxu@nsd.pku.edu.cn (J. Xu).

[1] Due to the lack of a comprehensive list of NDBs, researchers have mostly investigated the role of a single NDB, such as the Brazilian Development Bank or the China Development Bank, in the credit market or industrial development (Lazzarini et al., 2015; Ru, 2018).

https://doi.org/10.1016/j.jimonfin.2022.102763
0261-5606/

that NDBs are prone to undue political intervention into credit allocation processes consequently channeling cheap credits to politically-connected firms that could have access to credits from commercial banks.

Our paper aims to fill this gap by building a novel and comprehensive list of NDBs worldwide to examine whether NDBs fill market gaps in the syndicated loan market. Specifically, our research questions are as follows: whether the NDB participation in the loan syndication helps to incentivize commercial banks to provide long-term and high-risk capital, provide financial support for credit-rationed borrowers, or refrain from procyclical lending during global liquidity cycles. Although the existing research has intensively examined state-owned banks (Sapienza, 2004; Shleifer and Vishny, 1994), few studies have systematically distinguished NDBs from state-owned commercial banks (SOBs). A major reason behind the paucity of academic research is lack of data. So far, there has been little systematic effort to identify NDBs worldwide. To make this research feasible, we have built a novel and comprehensive list of NDBs worldwide.

The syndicated loan market provides an ideal setting for testing whether NDBs fill gaps or create distortions in credit markets. First, syndicated loans are an important source for corporate finance (Lin et al., 2012; Sufi, 2007). The sheer size of the syndicated loan market ensures that our findings are relevant. Second, co-lending between NDBs and commercial banks has recently gained greater significance, as NDBs have been called upon to catalyze private capital, to scale up efforts to finance the Sustainable Development Goals agreed upon by the member states of the United Nations. Third, few NDBs disclose their loan-level data, which renders empirical research infeasible. But companies in the syndicated loan market are required to disclose their loan-level data because they are publicly listed companies or private companies that trade public debt securities.

We constructed a large sample of 48,912 syndicated loans granted to 10,698 firms in 71 countries over 1996–2016, among which there are 2,007 loans with at least one NDB involved. As a first test, we compare the contract terms for loans with and without NDB participation, controlling for a large set of loan-, firm-, borrower-, and country-specific characteristics, as well as year, industry, borrower, and country fixed effects. Our analysis shows that NDB involvement is associated with longer maturity, higher loan spreads, and smaller loan amount. These findings suggest that NDBs tend to provide long-term and high-risk capital to companies that may be credit constrained in private commercial banking systems.

To correct for the endogenous selection of NDBs in syndicate structures, we adopt two methods—the propensity score matching technique and the treatment effects model. Our main findings remain robust after accounting for selection on observables. In addition, our core findings still hold when taking into account potential omitted variables such as political connection of firms and the political risk of borrowers' countries,[2] and further controlling for country*year, industry*year, and country*industry fixed effects. Finally, we conduct a battery of subsample analyses by focusing on non-U.S. borrowers, cross-border loans, loans with NDBs as lead banks, and NDBs from different country income groups, and find that our results remain robust.

Furthermore, to rule out the hypothesis that the effect of longer maturity and higher spreads is driven by other similar types of financers in the loan syndication, we conduct a horse race test to compare the effects of NDBs with those of multilateral development banks (MDBs) and SOBs in a joint regression. The results show that NDBs and MDBs tend to issue smaller loans with longer maturity. The pricing effect is pronounced only for NDB loans. The effects do not stem from SOBs.

We then take a step further to assess whether NDB lending to heterogeneous groups of borrowers. In general, we find evidence that NDBs tend to extend substantially larger loans to financially constrained and informationally opaque borrowers. NDBs also issue larger and longer-term loans to firms in the infrastructure sector. Compared with profit-driven lenders, NDBs offer credit at more favorable terms and larger amounts to firms with high country risk, as measured by institutional quality and creditor rights.

Finally, we examine whether NDBs play a countercyclical role during global liquidity cycles. We find that NDBs tend to provide countercyclical lending in times of liquidity shortage defined as a decline in lending activity by financial institutions as a result of tightening of U.S. monetary policy, banking crises, and economic recessions. Furthermore, we find that NDBs tend to boost their support for low-quality firms that are prone to the shrinking financial support from commercial banks when the U.S. monetary policy tightens (i.e., the U.S. Federal Reserve implements the contractionary monetary policy through policy action such as decreasing the money supply to raise the effective federal funds rate). We also find that NDBs strengthen their support for domestic firms that suffer from a reduction in the average loan size by commercial banks during banking crises or recessions.

Our paper makes three original contributions to the literature. First, to the best of our knowledge, our paper is the first one that examines how NDB participation affects loan contract terms in the syndicated loan market in a cross-country setting. This extends a burgeoning literature on non-conventional lenders in the syndicated loan market. Second, using a comprehensive dataset of syndicated loans with the participation of worldwide NDBs, our paper sheds light on the theoretical debate on whether NDBs fill market gaps. Our analysis of borrower heterogeneity reveals that NDBs provide financial support for financially constrained borrowers. Third, our paper adds to the literature on cyclicality of bank lending. Complementary with prior studies that document countercyclical lending by MDBs and SOBs using country-level or bank-level aggregate data (Brei and Schclarek, 2013, 2018; Galindo and Panizza, 2018), we use more granular data at the loan level and find that NDBs play a countercyclical role.

[2] As the data availability of these omitted variables is more limited than that of control variables in our baseline model, we put the analysis of these omitted variables in the robustness check.

The rest of the paper proceeds as follows: in Section 2, we review the related literature on why NDBs are needed and whether NDBs address market failures to lay the foundation for the empirical analysis; in Section 3, we introduce the working definition, qualification criteria, and practical significance of NDBs–an understudied financial intermediary in the finance literature; in Section 4, we present the sample construction, baseline empirical method, and descriptive statistics; in Section 5, we present the empirical results and conducts further tests; finally, we conclude with key findings.

2. Related literature

A laissez-faire commercial banking system often suffer from market failures that justifies the establishment of NDBs to fill the gaps.[3] First, long-term finance is usually in short supply in a laissez-faire commercial banking system. Commercial banks are often reluctant to provide long-term loans, because they take household deposits as their main funding source and hence suffer from maturity mismatch, liquidity risks, and potential runs in the provision of long-term finance (Martin et al., 2014). Furthermore, coordination failures among profit-driven commercial banks worsen such a shortage, resulting in a "maturity rat race" in which all lenders shorten the maturity of contracts to protect their claims (Brunnermeier and Oehmke, 2013).

Another challenge of private commercial banking systems is credit rationing as a result of information asymmetry, lack of collateral, and risk aversion. According to the classic credit rationing model by Stiglitz and Weiss (1981), higher interest rates may not only induce firms to undertake overly risky projects, but also discourage safe borrowers. As lenders cannot easily distinguish "good borrowers" from "bad borrowers" owing to information asymmetry, profit-driven commercial banks are not willing to finance high-risk and high-cost projects. Consequently, good projects with high private returns become wasted investment opportunities. Although screening and monitoring by banks may mitigate the negative effect of information frictions in the credit market (Diamond, 1984; Holmstrom and Tirole, 1997; Milde and Riley, 1988; Sharpe, 1990), credit rationing remains a problem specially for informationally opaque small borrowers without sufficient collateral as well as firms from countries with poor institutions. Small opaque firms are more constrained because they lack collateral to signal their creditworthiness and their soft information is difficult to verify. To measure financial constraints, a series of proxies have been developed (Farre-Mensa and Ljungqvist, 2016; Fazari et al., 1988; Hadlock and Pierce, 2010; Kaplan and Zingales, 1997; Whited and Wu, 2006). Sufi (2009) shows that firms that are financially constrained lack access to banks' line of credit and rely on their corporate liquidity management. Berger et al. (2001) and Kirschenmann (2016) show that credit rationing is higher for opaque small firms. Using a firm-level survey database covering 48 countries, Beck et al. (2008) confirm that small firms and firms in countries with poor institutions are less likely to obtain bank finance. In sum, information asymmetry, lack of collateral, and risk aversion would deprive borrowers of credit support.

Last, commercial banks are prone to procyclical lending (Becker and Ivashina, 2014; Forbes and Warnock, 2012; Fratzscher, 2012; Ivashina and Scharfstein, 2010). Specifically, the procyclical lending by commercial banks is exhibited in the *flight home effect* and *flight-to-quality effect*. The *flight home effect* refers to the phenomenon where lenders rebalance their loan portfolios in favor of domestic borrowers. Giannetti and Laeven (2012a) find that the *flight home effect* helps explain the collapse of the global syndicated loan market during financial crises. Giannetti and Laeven (2012b) further show that an increase in the home bias of international lending exacerbates international credit cycles. De Haas and van Horen (2012) confirm that the resilience of cross-border credit is associated with bank-borrower closeness. The *flight-to-quality effect* refers to the fact that economic recessions witness a reduction in the share of credit flowing to borrowers with more severe asymmetric information and agency problems (Bernanke et al., 1996; Lang and Nakamura, 1995). Ongena et al. (2018) show that following a decrease in U.S. home prices, German banks exposed to the U.S. real estate sector cut lending in Germany to firms in riskier industry-region combination. Bräuning and Ivashina (2020) find that low-quality borrowers from emerging market economies tend to suffer from more fluctuations in the credit supply than borrowers from developed countries over a typical U.S. monetary easing cycle.

Despite the aforementioned rationales for establishing NDBs, however, there are competing views on whether NDBs can address market failures. On the one hand, the development view maintains that NDBs can be a potent policy instrument created and deployed by the state to fill market gaps where commercial banks are unwilling or unable to provide financial support despite social, economic, or environmental benefits of investment projects (Griffith-Jones and Ocampo, 2018). If this view holds water, we would expect that NDBs are able to provide long-term and high-risk capital, offer financial support for credit-rationed borrowers, and play a countercyclical role during global liquidity cycles. A burgeoning literature has pointed out that NDBs lend longer than commercial banks (Schclarek, et al, 2022; Hu, et al., 2022), finance projects with positive externalities (Schclarek and Xu, 2022), and act countercyclically during global liquidity cycles (Brei and Schclarek. 2018; Eslava and Freixas, 2021; Galindo and Panizza, 2018). On the other hand, the political view contends that NDBs suffer from government failures owing to their poor corporate governance (World Bank, 2015). This view would expect that NDBs provide cheap credits to politically-connected firms that could have obtained financial support from commercial banks (Dinc, 2005; Faccio, 2006; Houston et al., 2014). Empirical research has found that NDBs increase their lending activity in election years (Frigerio and Vandone, 2020) or subsidizes firms that could fund their projects with alternative sources of capital (Lazzarini et al., 2015). In short, it is an unsettled debate on whether NDBs address market failures.

[3] While acknowledging the possibility that NDBs may suffer from government failures, it is beyond the scope of the present paper to examine the conditions under which NDBs are well-governed and the niches of NDBs in addressing market failures compared with alternative means of state intervention.

Our paper contributes to the debate on whether development banks fill market gaps by using a comprehensive loan-level data with NDB participation worldwide in the syndicated loan market. Our paper sheds light on the role of non-conventional lenders in the syndicated loan market. Nandy and Shao (2010) and Lim et al. (2014) investigate non-bank institutional investors such as hedge funds and mutual funds. Fotak and Lee (2020) find that "mixed" syndicated loans, including private and government-owned lenders, allocate more favorable loans to government-connected firms than private syndicates do.[4] Broccolini et al. (2021), Gurara et al., (2020), and Hainz and Kleimeier (2012) focus on the role of MDBs.[5] Yet, little is known about the effect of NDB participation on loan contract terms in the syndicated loan market. To the best of our knowledge, this is the first paper that examines how NDB participation affects loan contract terms.[6] Based on a novel, manually-collected database on worldwide NDBs, we attempt to fill this gap by comparing the contract terms of loans with and without NDB involvement in a cross-country setting.

In a study that is closely related to our work, Gurara et al. (2020) empirically test the effect of MDBs on loan pricing and non-pricing terms. They show that MDB participation is associated with higher loan spreads and longer maturities, suggesting that MDBs finance risky projects that may not be financed by the private sector. Our paper extends the scope of their study from MDBs to NDBs worldwide and achieves similar main results of higher loan spreads and longer maturities. Our study differs from Gurara et al. (2020) in five major aspects. First, unlike focusing on cross-border loans only in their study, our sample contains both domestic and cross-border loans. Second, we account for borrower risk by controlling for accounting variables of borrowing firms from Compustat. Third, firm-specific variables allow us to exploit borrower heterogeneity to get a better understanding of the differentiated effects of NDB participation across different types of borrowers. Fourth, in addition to adopting the propensity score matching technique, we account for the endogenous selection of NDBs into syndicates by employing the treatment effects model. Last, we further explore whether NDBs play a countercyclical role during global liquidity cycles.

3. Definition, qualification criteria, and practical significance of NDBs

To make our research feasible, we manually constructed a new database on NDBs worldwide. We define NDBs as financial institutions created and steered by national governments to deploy loans or other financial instruments to fulfill public policy objectives as stipulated in their official mandates. To distinguish NDBs from other similar entities, we propose five qualification criteria. First, NDBs have a separate legal personality, financial account, and dedicated personnel and are not set up to achieve short-term goals, which helps to be distinct from government credit programs and special purpose vehicles. Second, they deploy loans or other financial instruments that permit some form of repayment, capital dividends, or risk premium from borrowers, differentiating them from grant-executing agencies. Third, their funding sources go beyond periodic budgetary transfers, which distinguishes them from aid agencies. Fourth, NDBs have a public policy–oriented official mandate, distinguishing them from profit-driven financial institutions. Fifth, governments play a steering role in setting the corporate strategy of NDBs, that is, they are initiated or owned by the government, rely on sovereign creditworthiness or support to raise funds, and have government officials on their boards of directors. Only entities that meet all five of these criteria can be qualified as an NDB (Xu et al., 2021a).

To identify NDBs worldwide, we rigorously applied the five qualification criteria to each development financing institution (DFI) or DFI-like association. Here, DFI is an umbrella term that includes development banks at the multilateral, national, and subnational levels and equity, guarantee, and insurance-focused financial institutions sponsored by governments with a development-oriented mandate. DFI associations include the World Federation of DFIs, which has four regional chapters in Africa, Asia and the Pacific, Latin America, and the Islamic countries. DFI associations also include the Global Network of Export-Import and DFIs, the Association of Bilateral European DFIs, and the International Development Finance Club. DFI-like associations include the European Association of Public Banks, the Long-Term Investors Club, and the Network of European Financial Institutions for Small and Medium Sized Enterprises. As not all NDBs choose to be members of DFI associations, we took a step further to investigate the official classification of national financial systems country by country, by visiting the official websites of central banks and national regulatory agencies. After identifying DFI-like official categories, such as specialized financial institutions, we applied the qualification criteria to discern NDBs.

In total, we identified 375 NDBs worldwide. The total assets of all the NDBs are as much as US$9 trillion, accounting for about 10 % of global gross domestic product (GDP). Most countries have established NDBs to support economic and social development. Based on the firsthand data collection, we find that a majority of countries have established NDBs. On average, each country has about two NDBs, and among the 218 economies worldwide, 152 have NDBs. Historically, NDBs played a crucial role in speeding up the industrialization of Europe in the mid-19th century (Cameron, 1953) and reconstructing Western Europe and Japan after World War II. Furthermore, NDBs have played an indispensable role in speeding up the industrialization and urbanization process in emerging markets such as South Korea, Brazil, and China. Take the China Development Bank (CDB) as an example. CDB was established in 1994 and has become an important provider of long-term finance in China and abroad. Currently, CDB is the largest loan-providing NDB, with assets of more than US$2.6 trillion

[4] Yet, the authors primarily focus on state-owned commercial banks and exclude NDBs in their sample construction.
[5] Hainz and Kleimeier (2012) focused on MDBs and prominent NDBs such as export–import banks. But they did not systematically identify NDBs worldwide.
[6] Degl'Innocenti et al. (2022) study whether the participation of development banks influences syndicate structure.

in 2020, on a par with the largest U.S. bank, JP Morgan. CDB's asset holdings are much larger than those of the World Bank and the main regional development banks combined.

4. Sample construction, empirical method, and summary statistics

4.1. Sample construction

We construct our sample of syndicated loans using data from Thomson Reuters Loan Pricing Corporation Dealscan, which provides a comprehensive record of syndicated loan transactions around the world.[7] Dealscan contains detailed information on the contract terms of syndicated loans, such as loan pricing, maturity, and size, as well as information on borrower and lender identities. To construct the sample, we began with all syndicated facilities in Dealscan that originated between 1996 and 2016,[8] a total of 189,042 loan facilities. Following Ivashina (2009), we excluded loans to firms operating in the financial sector (Standard Industrial Classification (SIC) codes 60–64). To control for firm-level financial statements, we matched the sample with the Compustat Global and Compustat North America databases via the link provided by Chava and Roberts (2008). To account for ownership structure of the borrower, we obtained information on whether a firm is state-owned from Deanscan, Orbis, and Osiris. In addition, we merge our loan sample with macroeconomic controls from the World Development Indicators (GDP per capita), Moody (sovereign rating), Chinn and Ito (2006) (capital account openness), Djankov, McLiesh, and Shleifer (2007) and World Bank's Doing Business (creditor rights), and World Governance Indicators (governance). We further drop facility observations if any loan-level covariate is missing. Finally, we obtained a final sample of 48,912 syndicated loans granted to 10,698 firms in 71 countries.[9]

We then identified the syndicated loans with NDB participation. We considered a loan as an NDB loan if at least one NDB was involved in the syndicate. We then matched lenders from Dealscan to the list of NDBs by bank name and location.

Table 1, panel A, tabulates the distribution of loans across borrower countries. Specifically, we show the number and amount of syndicated loans and NDB loans as well as their respective shares in each country. Although most loans are borrowed by firms headquartered in advanced economies, the aggregate proportion of NDB loans that flow to emerging markets and developing countries is higher than the proportion of all syndicated loans.

Table 1, panel B, tabulates the distribution of loans across industries. NDB loans exhibit distinct patterns. More than two-fifths of NDB loans (in terms of loan amount) are concentrated in the infrastructure sector, including transportation, communications, electricity, gas, and sanitation. This stands in sharp contrast with less than a third of all syndicated loans. By contrast, NDBs only provide modest support for retail trade (2.54 %) and services (6.83 %), which are much smaller than the percentages of all syndicated loans (6.92 % and 12.42 %, respectively).

Table 1, panel C, presents some stylized facts on NDB lending. The lion's share of NDB loans (89 %) are issued by NDBs in high-income countries (HICs), followed by 14 % from middle-income countries (MICs). In addition, 2 % of NDB loans are issued by NDBs in HICs and MICs. A majority (71 %) of NDB loans are cross-border flows, and only 29 % of NDB loans are extended to domestic borrowers. Most NDB loans (78 %) are granted to firms headquartered in HICs, and 11 % to upper-middle-income countries and lower-middle-income countries respectively.

4.2. Empirical method and summary statistics

To test the impact of NDB participation on loan contract terms, we deploy the following model, where l, f, i, c, and t denote loan facility, firm, industry, borrower country, and year, respectively:

$$Y_{l,f,i,c,t} = c + \alpha NDB_{l,t} + \theta' \boldsymbol{Loan}_{l,t} + \gamma' \boldsymbol{Firm}_{i,f,t-1} + \varphi' \boldsymbol{Country}_{c,t} + \delta_i + \delta_c + \delta_t + \varepsilon_{f,l,i,c,t}$$

The dependent variable, $Y_{l,f,i,c,t}$, refers to three dimensions of loan contract terms. *Loan Spread*, is the All-in-Drawn Spread over the London Interbank Offered Rate (LIBOR) measured in basis points, as a measure of the overall costs of the loan, accounting for one-time and recurring fees. *Maturity* is the number of years of tenor at origination. *Loan size* is the logarithm of the facility amount in millions of U.S. dollars. The variable of primary interest is $NDB_{l,t}$, a binary variable that equals 1 if at least one lender in the syndicate is an NDB. In most of the regressions, we include loan-specific variables ($\boldsymbol{Loan}_l$), firm-specific variables ($\boldsymbol{Firm}_f$), borrower country-specific variables ($\boldsymbol{Country}_c$), industry fixed effects (δ_i), borrower country fixed effects (δ_c), and year fixed effects (δ_t). $\varepsilon_{f,l,i,c,t}$ is the error term.

[7] Dealscan presumably has better coverage than the Dealogic Loan Analytic data in Gurara et al. (2020), in the sense that Dealscan contains more than 150,000 domestic and cross-border loans to advanced and emerging economies over 1996–2016, far more than the 23,000 cross-border loans to emerging markets over 1994–2014 in Gurara et al. (2020). Yet Dealscan has limited coverage of MDB loans, and thus we focus on NDBs.

[8] Our sample period starts in year 1996 due to scarce data availability for the control variables and the poor coverage of Dealscan in the preceding years.

[9] To control for firm-level and country-level variables, we have to accept a much smaller final sample size owing to missing variables. This practice, however, is not uncommon when using data from Dealscan (Fotak et al., 2019; Fotak and Lee, 2020). Our matching rate (25.87% in terms of the number of loans, or 21.80% in terms of the number of borrowers, of the initial Dealscan sample size) is comparable to other cross-country studies that matched Dealscan with firms' financial information, for example 18.40% in Fotak and Lee (2020) in terms of the number of borrowers, or 28.17% in Bae and Goyal (2009) in terms of the number of loans.

Table 1
Sample distribution.

Panel A: Loans, by borrower country/economy

Borrower country/ economy	# of loans	Percent (num)	Amt of loans (bn USD)	Percent (amt)	# of NDB loans	Percent (num NDB loans)	Amt of NDB loans (bn USD)	Percent (amt NDB loans)
Argentina	16	0.03	1.95	0.01	1	0.05	0.14	0.01
Australia	743	1.52	223.47	1.04	47	2.34	21.96	1.36
Austria	25	0.05	21.95	0.1	3	0.15	3.65	0.23
Bahrain	2	0	0.4	0	2	0.1	0.4	0.02
Bangladesh	4	0.01	0.35	0	1	0.05	0.16	0.01
Belgium	121	0.25	202.35	0.94	1	0.05	0.3	0.02
Bolivia	2	0	0.22	0	1	0.05	0.17	0.01
Brazil	132	0.27	68.28	0.32	30	1.49	17.06	1.06
Bulgaria	13	0.03	4.93	0.02	0	0	0	0
Cambodia	3	0.01	0.65	0	2	0.1	0.59	0.04
Canada	170	0.35	33.98	0.16	6	0.3	7.71	0.48
Chile	59	0.12	16.54	0.08	25	1.25	6.54	0.4
China	362	0.74	45.13	0.21	70	3.49	12.32	0.76
Colombia	11	0.02	6.5	0.03	0	0	0	0
Croatia	10	0.02	2.31	0.01	0	0	0	0
Cyprus	12	0.02	4.46	0.02	5	0.25	2.36	0.15
Czech Republic	20	0.04	5.46	0.03	1	0.05	0.01	0
Denmark	43	0.09	53.43	0.25	5	0.25	18.21	1.13
Egypt, Arab Rep.	10	0.02	2.74	0.01	2	0.1	0.56	0.03
Finland	85	0.17	68.15	0.32	6	0.3	3.08	0.19
France	868	1.77	896.26	4.19	33	1.64	71.63	4.43
Germany	769	1.57	1296.51	6.05	154	7.67	384.15	23.75
Greece	35	0.07	13.42	0.06	1	0.05	0.8	0.05
Hong Kong SAR, China	684	1.4	80.1	0.37	73	3.64	17.26	1.07
Hungary	33	0.07	25.83	0.12	7	0.35	4.64	0.29
Iceland	13	0.03	2.96	0.01	2	0.1	0.88	0.05
India	442	0.9	71.38	0.33	163	8.12	33.73	2.09
Indonesia	69	0.14	9.79	0.05	17	0.85	2.04	0.13
Ireland	57	0.12	29.98	0.14	1	0.05	0.2	0.01
Israel	31	0.06	42.57	0.2	0	0	0	0
Italy	211	0.43	353.15	1.65	14	0.7	27.8	1.72
Japan	427	0.87	69.65	0.33	102	5.08	13.35	0.83
Jordan	2	0	0.06	0	0	0	0	0
Kazakhstan	15	0.03	13.27	0.06	5	0.25	6.85	0.42
Korea, Rep.	548	1.12	49.82	0.23	262	13.05	27.47	1.7
Kuwait	7	0.01	2.17	0.01	0	0	0	0
Malaysia	118	0.24	15.18	0.07	4	0.2	0.43	0.03
Mauritius	18	0.04	5.35	0.02	2	0.1	0.05	0
Mexico	177	0.36	86.39	0.4	60	2.99	29.61	1.83
Netherlands	440	0.9	345.18	1.61	21	1.05	26.25	1.62
New Zealand	48	0.1	9.17	0.04	1	0.05	0.65	0.04
Nigeria	8	0.02	5.84	0.03	0	0	0	0
Norway	162	0.33	47.71	0.22	6	0.3	2.06	0.13
Oman	5	0.01	1.15	0.01	2	0.1	0.8	0.05
Pakistan	12	0.02	0.01	0	0	0	0	0
Panama	4	0.01	1.76	0.01	0	0	0	0
Papua New Guinea	8	0.02	2.5	0.01	0	0	0	0
Peru	15	0.03	3.53	0.02	5	0.25	2.37	0.15
Philippines	126	0.26	19.29	0.09	37	1.84	7.24	0.45
Poland	44	0.09	25.86	0.12	3	0.15	3.17	0.2
Portugal	49	0.1	71.91	0.34	9	0.45	8.57	0.53
Qatar	10	0.02	7.25	0.03	2	0.1	2	0.12
Russian Federation	64	0.13	65.36	0.31	0	0	0	0
Saudi Arabia	31	0.06	20.77	0.1	1	0.05	0.94	0.06
Singapore	314	0.64	106.67	0.5	41	2.04	16.59	1.03
Slovak Republic	8	0.02	2.6	0.01	0	0	0	0
Slovenia	2	0	0.52	0	0	0	0	0
South Africa	93	0.19	39.22	0.18	11	0.55	0.97	0.06
Spain	406	0.83	540.49	2.52	123	6.13	275.12	17.01
Sri Lanka	2	0	0.07	0	0	0	0	0
Sweden	165	0.34	98.03	0.46	12	0.6	11.24	0.69
Switzerland	182	0.37	292.65	1.37	15	0.75	14.48	0.9
Thailand	73	0.15	12.72	0.06	7	0.35	0.79	0.05
Trinidad and Tobago	3	0.01	0.44	0	0	0	0	0

Table 1 (*continued*)

Panel A: Loans, by borrower country/economy

Borrower country/ economy	# of loans	Percent (num)	Amt of loans (bn USD)	Percent (amt)	# of NDB loans	Percent (num NDB loans)	Amt of NDB loans (bn USD)	Percent (amt NDB loans)
Turkey	66	0.13	19.38	0.09	15	0.75	6.69	0.41
Ukraine	12	0.02	2.78	0.01	0	0	0	0
United Arab Emirates	37	0.08	32.98	0.15	4	0.2	3.28	0.2
United Kingdom	2,073	4.24	1,748.86	8.17	104	5.18	100.12	6.19
United States	38,065	77.82	14,060.03	65.66	475	23.67	417.22	25.8
Venezuela, RB	4	0.01	0.25	0	1	0.05	0.16	0.01
Vietnam	14	0.03	1.35	0.01	4	0.2	0.34	0.02
Total	48,912	100	21,413.42	100	2,007	100	1,617.16	100

Panel B: Loans by industry

Industry	# of loans	Percent (# of loans)	Amt of loans (bn USD)	Percent (amt)	# of NDB loans	Percent (# of NDB loans)	Amt of NDB loans (bn USD)	Percent (amt NDB loans)
Agriculture, Forestry, Fishing	208	0.43	97.17	0.45	5	0.25	1.28	0.08
Construction	661	1.35	327.68	1.53	66	3.29	63.99	3.96
Real Estate	667	1.36	193.65	0.9	15	0.75	2.32	0.14
Manufacturing	19,559	39.99	7,933.37	37.05	875	43.6	547.8	33.87
Mining	3,077	6.29	1,783.42	8.33	166	8.27	135.09	8.35
Public Administration	13	0.03	1.44	0.01	0	0	0	0
Retail Trade	4,059	8.3	1,481.47	6.92	51	2.54	20.03	1.24
Services	8,587	17.56	2,659.04	12.42	137	6.83	114.85	7.1
Transportation, Communication, Electric, Gas, and Sanitary Services	9,565	19.56	6,242.17	29.15	626	31.19	696.91	43.1
Wholesale Trade	2,516	5.14	693.98	3.24	66	3.29	34.86	2.16

Panel C Stylized fact of NDB lending

	# Loans	Share
HIC NDBs	1,777	89%
MIC NDBs	279	14%
HIC & MIC NDBs	49	2%
NDB loans to foreign borrowers	1,416	71%
NDB loans to domestic borrowers	591	29%
Firms from HICs	1,570	78%
Firms from UMICs	210	11%
Firms from LMICs	227	11%
NDBs as lead banks	1,007	50%
NDBs as participants	1,087	54%
NDBs as lead banks & participants	87	4%
NDB loans, total	2,007	100%

This table presents the sample distribution. Panel A tabulates the distribution of syndicated loans by borrower countries. Panel B tabulates the distribution of syndicated loans by 10 industries. Panel C shows some stylized facts of NDB participation in syndicated loans. HIC = high-income country; MIC = middle-income country; NDB = national development bank; LMIC = lower-middle-income country; UMIC = upper-middle-income country.

We have a rich set of loan controls. We take the loan pricing regression as an example to justify the choice of control variables. First, we include *loan size* and the *maturity* of the loan,[10] because larger loans with longer maturities may represent more credit risk and liquidity risk, hence raising the lending rate. But it is also plausible that larger loans may allow economies of scale in processing and monitoring the loan, and that loans with longer maturities may be more likely to be granted to more creditworthy firms, thus reducing the loan spread. Hence, the effects are ambiguous. Second, following Acharya et al. (2013), we control for each loan's liquidity exposure, measured by a line of credit (*Revolver*) or a term loan (*Term loan*). Third, we include a dummy variable that indicate whether a loan is a senior debt (*Senior*) in the borrowers' liability structure. Lenders of senior loans typically recover much more of their investment in the event of borrower default and therefore charge lower lending rates. Fourth, collateral is an important feature in loan contracts that reduces losses in the event of borrower default, but it is more likely to be required for risky borrowers. Therefore, we include a dummy for pledged collateral (*Secured*). Fifth, we include a measure of stringency of covenant. Following Bradley and Roberts (2015), we calculate covenant intensity (*Covenant*) as the sum of indicator variables for dividend restriction, asset, equity, debt sweep, secured, and two financial covenants or

[10] We drop loan size and maturity as a control in the size regression and the maturity regression, respectively.

more, ranging from 0 to 6. Sixth, we use the number of facilities within a deal (*No. of facilities*) and the number of lenders within a facility (*No. of lenders*) to proxy for the syndicate structure, as larger loans usually have larger syndicates. Seventh, as the purpose of obtaining loans is likely to influence loan terms, we create five dummies for loan purposes: corporate purpose (CorpPurpose), debt repayment (Repayment), takeover (Takeover), working capital (WorkCapital), and others (OtherPurposes). Last, to account for the currency denomination effect (Carey and Nini, 2007; Gong, Jiang, and Wu, 2018), we include five currency dummies: USD, EUR, JPY, GBP, and others.

Following Santos and Winton (2008), we control for a set of firm-specific variables that may affect loan contract terms.[11] To obtain most firm-specific variables, we match the Dealscan sample with the Compustat Global and Compustat North America databases via the link provided by Chava and Roberts (2008). We use the accounting variables measured at the end of the year prior to loan origination.[12] Again, we take the loan pricing regression as an example to explain the choice of firm-level controls. First, we include *firm size*, the logarithm of the firm's total assets in thousands of U.S. dollars. The rationale is that larger firms are usually better diversified across customers, suppliers, and regions, which would have a negative effect on the loan spread. Second, we include *Leverage* measured as the ratio of total debt to total assets. Leveraged firms are more likely to default and hence are expected to be charged a higher lending rate. Third, we control for firms' profitability using net income divided by sales (*Profit Margin*) and return on assets (*ROA*). As more profitable firms are safer, they should be charged a lower spread. Fourth, we include net working capital to total assets (*NWC*), measuring the liquid asset base. Firms with higher NWC are less likely to lose value in case of default. Fifth, we also include *tangibility* to control for a firm's loss given default. Tangibility measures the fraction of tangible assets on the balance sheet. Borrowers with more tangible assets are more informationally transparent (Morgan, 2002) and have higher values in the event of default. Hence, we expect them to exhibit lower spreads. Sixth, considering ownership structure of the borrower, we include a dummy for state-owned firms, *SOE*, which is equal to one if the borrower is a state-owned enterprise and zero otherwise. The rationale is that potential sources for external finance may be different for state-owned firms and privately owned firms. We obtain information on SOE primarily from Dealscan, Orbis, and Osiris.[13] Finally, we include borrower industry dummies from Dealscan that classify borrowers into 10 sectors based on two-digit SIC codes, as loss given default is strongly correlated with industry characteristics (James and Kizilaslan, 2014).

We control for a set of borrower country-specific variables. First, to account for the level of economic development of the borrowers' home country, we include the logarithm of real GDP per capita (GDPpc) from the World Development Indicators (WDI). Second, following Lin, et al. (2012) and Giannetti and Laeven (2012a), we include Moody's sovereign rating of the borrower's home country to account for sovereign risk. The sovereign rating takes the value 17 if the country has an AAA rating, and the value decreases as the rating deteriorates, with the lowest value of 1 for ratings below B-. As a considerable fraction of the sample loans are cross-border loans, we include an index for capital account openness, KAOPEN, as in Chinn and Ito (2006). Finally, the existing literature shows that the institutional quality of borrowers' home country affects loan terms (Qian and Strahan, 2007; Bae and Goyal, 2009; Delis et al., 2020). Hence, we account for the institutional quality of the borrowers' country by including creditor rights, proxied by the strength of legal rights index from Djankov, McLiesh, and Shleifer (2007) and the World Bank's Doing Business survey, and governance from the Worldwide Governance Indicators (WGI). The strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending, ranging from 0 (weak) to 12 (strong).[14] Governance is the average of six dimensions of governance—voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Each individual governance index ranges from −2.5 (weakest) to 2.5 (strongest).

Throughout the analysis, we control for borrower-country fixed effects to absorb time-invariant, country-specific factors that may shape loan contracts. In addition, we also include year dummies to capture time trends, since the business cycle may affect loan contracts (Santos, 2011). To mitigate the influence of outliers, we winsorize the loan spreads and firm-specific variables at the 1 and 99 percentile levels. For most of the specifications, we employ robust standard errors clustered at the borrower level, which are reported in parentheses below the coefficient estimates in the tables. The definitions and

[11] Drawing on the Loan Pricing Corporation's Dealscan database, Santos and Winton (2008) compare bank loan spreads for bank-dependent borrowers with bank loan spreads for borrowers that have continuing access to public debt markets, controlling for a number of loan- and firm-specific factors. Their research question is analogous to ours, as our paper compares the loan contract terms (including loan spreads) of syndicated loans with the NDB participation with those without NDB participation.

[12] To avoid reverse causality, we match borrower accounting information from the fiscal year ending in calendar year *t*-1 to loans made in calendar year *t*.

[13] We use Dealscan as the basic source. Dealscan has a subset of organization type, which describes the type of companies. We define SOE borrowers as those of which organization type is classified as "Government-Sovereign", "Government-local", "Government-owned", "Government-owned (local)", or "Government-owned (part)". For those of which Dealscan organization type is missing, we match Dealscan borrower name with companies in Orbis and Osiris (EBRD, 2020; Lin, et al., 2011, 2012). Orbis and Osiris have a variable called "state-owned enterprises", which is defined as governments being the ultimate owner; we coded "state-owned enterprises" as SOEs. Finally, we also manually search Wikipedia, *SEC* website, and Company-Histories.com to cross check.

[14] The World Bank's Doing Business has two versions: the old creditor rights index ranges from 0 to 10 for 2005–2014 (DB05-14 methodology), and the new creditor rights index ranges from 0 to 12 for 2014–2020 (DB15-20 methodology). We use the old creditor rights index on the scale of 10 for 2004–2014, and the new creditor rights index on the scale of 12 for 2015–2016. This index measures the extent to which bankruptcy and collateral legislation defends the rights of lenders.Regarding the data ranging from 1996 to 2004, having followed the existing literature on creditor rights (see for example, Bae and Goyal, 2009), we use creditor rights data from Djankov, McLiesh, and Shleifer (2007) for 1996–2003. The creditor rights index is a scale variable ranging from 0 (weak creditor rights) to 4 (strong creditor rights). It is not uncommon to combine both Djankov, McLiesh, and Shleifer (2007) and World Bank's Doing Business for a longer sample period (see for example, Safavian and Sharma, 2007). The initial methodology of the legal rights index in the World Bank's Doing Business was developed by Djankov, McLiesh, and Shleifer (2007) and is adopted with minor changes. In addition, following Renneboog, Szilagyi, and Vansteenkiste (2017), we use the value of creditor rights in year 2003 to fill in the gap of year 2004.

sources of all the variables are presented in Appendix Table A1. Table 2 reports the summary statistics for the core variables. The average All-in-Drawn Spread is 214.54 basis points. The sample mean of loan maturity is 4.20 years. The size of the loans is US$437.79 million on average.

5. Empirical results and discussion

5.1. Baseline pooled ordinary least squares regression

Table 3 reports the results of the baseline pooled ordinary least squares (OLS) regression. First, we examine the pricing effect of NDBs in column 1. NDB loan obtains a positive and significant estimate at the 1 % level, which translates into a loan premium of 16.57 basis points higher than non-NDB loans. Then we assess the effect of NDB involvement on loan maturity in column 2. The coefficient of the NDB loan dummy is positive and statistically significantly at the 1 % level. The estimate implies that NDB loans are 0.38 year longer than non-NDB loans, which is 9 % (0.38/4.20) of the sample mean. Column 3 shows that the coefficient on the NDB lender indicator is −0.24, which is statistically significant at the 1 % level. The effect is economically sizable. Holding all else constant, loan facilities with at least one NDB lender are 24 % smaller in terms of loan amount than those without NDB involvement. In sum, syndicated loans with NDB participation are characterized by higher spreads, longer maturity, and smaller amounts compared with those without NDB participation.

Our baseline analysis indicates that syndicated loans with NDB participation are more likely to provide long-term and high-risk capital than those without. Compared with profit-driven commercial banks, NDBs have distinct business models that may enable them to provide long-term and high-risk capital.

First, NDBs usually do not take short-term household deposits as commercial banks do. Instead, NDBs often rely on government creditworthiness to issue long-term bonds in capital markets or on-lending from MDBs that enjoy an AAA credit rating to issue bonds at reasonable costs, thanks to the sovereign guarantee of their member states, especially the HICs. Hence, the long-term liability structure and government support enable NDBs to provide long-term loans on their asset side (Schclarek et al., 2022; Hu et al., 2022). For instance, the German NDB Kreditanstalt für Wiederaufbau was created in 1948 to finance the long-term reconstruction of Germany after World War II. It issues bonds on international capital markets as the primary funding source, and by the end of 2017, it had a 5:1 ratio of long-term loans vis-à-vis short-term loans. Another example is China Development Bank (CDB), which is backed by the state's 100 % ownership and enjoys quasi-sovereign status according to international credit rating agencies such as Fitch. The State Council and China Banking and Insurance Regulatory Commission grant zero-risk weighting to CDB bonds, which provides a strong incentive to investors to purchase them. As of the end of 2019, CDB issued as much as 19 trillion RMB in the domestic capital markets (CDB, 2019). Compared with deposit-taking commercial banks aimed at maximizing profits, the advantage of CDB lies in its reliance on sovereign creditworthiness to issue bonds so that it can help to convert commercial banks' short-term capital into long-term capital.

Second, as they are owned and steered by governments, NDBs may have a larger risk appetite than private commercial banks. State-owned NDBs may be well positioned to provide high-risk capital to such investment projects. As the classical work by Arrow and Lind (1970) indicates, the state is better able to absorb risks than the private sector. Therefore, as a policy instrument created and deployed by the state, NDBs may be able to finance high-risk projects that private capital is not willing or capable to fund. For instance, the Business Development Bank of Canada is mandated to make "higher-risk and higher-cost loans" without competing with commercial banks (Layne 2016). Furthermore, NDBs have in-house industrial expertise and long-term investment evaluation frameworks, which enable them to venture into the creation of new productive activities (Diamond, 1957; de Aghion, 1999; Fernández-Arias et al., 2020).[15] Although commercial banks are unwilling to venture into a new industry, CDB relies on their industrial expertise to have the foresight of the industrial prospects and placed great emphasis on long-term growth potential. Overcoming the first-mover challenge helps to incubate the market after the demonstration of the initial success.[16]

In addition, it appears counterintuitive that syndicated loans with NDB participation are smaller than those without.[17] It is often perceived that NDBs provide large-scale capital to finance infrastructure. But in practice, not all NDBs are mandated to finance infrastructure. Some NDBs are established with the official mandate to finance small and medium-size enterprises, which often lack collateral and have little access to finance from commercial banks due to informational friction and credit rationing. Hence, on average, NDBs do not necessarily provide larger scale finance than commercial banks. Another potential explanation of the smaller loan size may be that NDBs as financial institutions need to break even. To guard against the high risks reflected in higher loan spreads, NDBs prudentially choose to invest in smaller projects and diversify risks in the syndicated loan market.

[15] For instance, as the lead arranger, CDB provided a syndicated loan to the bio-engineering project of Hisun Pharmaceutical to enhance the competitiveness of the Chinese pharmaceutical industry (CDB, 2013).

[16] Based on interviews with senior bank management at CDB, Beijing, August 2020.

[17] The result for smaller loan amounts holds even when the loan size is scaled by total assets of firms.

Table 2
Descriptive statistics.

	N	Mean	Std Dev	Min	Median	Max
NDB	48,912	0.04	0.20	0.00	0.00	1.00
NDB from HICs	48,912	0.04	0.19	0.00	0.00	1.00
NDB from MICs	48,912	0.01	0.08	0.00	0.00	1.00
NDB lead	48,912	0.02	0.14	0.00	0.00	1.00
NDB participant	48,912	0.02	0.15	0.00	0.00	1.00
MDB	48,912	0.00	0.04	0.00	0.00	1.00
SOB	48,912	0.06	0.24	0.00	0.00	1.00
Loan spread	48,912	214.54	147.42	17.50	200.00	775.00
Facility amount	48,912	437.79	1149.92	0.00	148.55	49,000.00
Facility size	48,912	4.76	1.84	−6.64	5.00	10.80
Maturity	48,912	4.20	2.36	0.08	5.00	60.42
Revolver	48,912	0.60	0.49	0.00	1.00	1.00
Term loan	48,912	0.35	0.48	0.00	0.00	1.00
Senior	48,912	1.00	0.06	0.00	1.00	1.00
Secured	48,912	0.53	0.50	0.00	1.00	1.00
Covenant	48,912	1.89	1.98	0.00	1.00	6.00
No. of facilities	48,912	2.05	1.43	1.00	2.00	18.00
No. of lenders	48,912	8.15	8.48	1.00	6.00	290.00
Firm size	48,912	6.90	2.47	2.00	7.00	15.00
Leverage	48,912	33.68	23.02	0.00	31.31	115.22
Profit Margin	48,912	0.57	23.00	−149.73	3.71	41.98
ROA	48,912	11.89	9.54	−30.05	11.71	38.86
NWC	48,912	12.40	18.93	−41.26	9.42	66.25
Tangibility	48,912	69.33	38.24	4.26	67.79	179.70
SOE	48,912	0.01	0.10	0.00	0.00	1.00
GDPpc	48,912	9.91	0.48	6.00	10.00	11.00
Sovereign rating	48,912	16.44	2.00	1.00	17.00	17.00
KAOPEN	48,912	0.96	0.16	0.00	1.00	1.00
Governance	48,912	1.29	0.36	−1.18	1.33	1.97
Creditor rights	48,912	5.03	3.93	0.00	4.00	11.00
Fed funds rate	48,912	2.77	2.28	0.07	2.09	6.52
Banking crisis	48,912	0.05	0.23	0	0	1
Recession	48,912	0.16	0.37	0	0	1

This table summarizes loan, borrower, and borrower country variables. Definitions of the variables are provided in Appendix Table A1. NDB = national development bank; HIC = high-income country; MIC = middle-income country; MDB = multilateral development bank; SOB = state-owned commercial bank; ROA = return on assets; NWC = net working capital to total assets; GDPpc = GDP per capita; KAOPEN = capital account openness index.

5.2. Endogeneity of NDB involvement

Although we have controlled for a large set of loan-, firm-, and country-specific covariates, our baseline specification may still be prone to a selection problem if NDBs endogenously choose to participate in syndicates with certain characteristics. In other words, the participation of NDBs is not a randomized assignment. Such a selection problem is inevitable, as it is expected that it is the mission of NDBs that support specific borrowers to fulfill public policy objectives. We nevertheless hope to separate the target-choosing effect (loan terms affected by borrower attributes that appeal to NDBs) from the treatment effect of NDB participation (loan terms influenced by the NDBs' lead or participation).

To isolate the effect of NDB participation on loan terms, we use two approaches—propensity score matching and the treatment effects model—to deal with observable factors that may be correlated with the decision of an NDB to join a syndicate.[18]

5.2.1. Propensity score matching

Following Bharath et al. (2011), we employ the propensity score matching technique to construct a matched sample of NDB loans and non-NDB loans. Essentially, the propensity score matching technique estimates the predicted probability of NDB participation based on observed characteristics. We first estimate a probit model as follows:

$$NDB_{l,t} = c + \gamma' \boldsymbol{Firm}_{i,f,t-1} + \varphi' \boldsymbol{Country}_{c,t} + \delta_i + \delta_c + \delta_t + \varepsilon_{f,l,i,c,t}$$

The dependent variable is NDB loans, a dummy variable that equals 1 if at least one NDB is involved in the syndicate and 0 otherwise.

For each loan facility, we estimate the predicted probability (namely, propensity score) of it being an NDB loan. We adopt the nearest neighbor estimator by matching each NDB loan with non-NDB loans that have the closest propensity scores. We match with replacement to produce better matches and reduce potential bias, but at a loss of precision. To avoid bad

[18] This caveat may still arise if the selection bias is driven by unobservables.

Table 3
Baseline OLS regression.

	Loan spread (1)	Maturity (2)	Loan size (3)
NDB	16.57***	0.38***	−0.24***
	(3.85)	(0.13)	(0.06)
Loan size	−15.22***	0.19***	
	(0.77)	(0.02)	
Maturity	−0.69*		0.05***
	(0.39)		(0.00)
Revolver	−67.62***	0.39***	−0.03
	(4.20)	(0.09)	(0.05)
Term loan	−7.53*	1.42***	−0.19***
	(4.26)	(0.09)	(0.05)
Senior	−279.73***	−3.35***	−0.04
	(20.69)	(0.87)	(0.10)
Secured	72.99***	0.63***	−0.29***
	(2.41)	(0.04)	(0.02)
Covenant	0.54	0.06***	0.07***
	(0.61)	(0.01)	(0.01)
No. of facilities	5.99***	0.17***	−0.20***
	(1.43)	(0.02)	(0.01)
No. of lenders	−1.27***	−0.00	0.05***
	(0.10)	(0.00)	(0.00)
Firm size	−7.74***	−0.01	0.41***
	(0.67)	(0.01)	(0.01)
Leverage	0.72***	0.00***	0.00***
	(0.04)	(0.00)	(0.00)
Profit margin	−0.41***	0.00	−0.00
	(0.05)	(0.00)	(0.00)
ROA	−1.64***	0.02***	0.02***
	(0.11)	(0.00)	(0.00)
NWC	−0.43***	0.01***	−0.00**
	(0.06)	(0.00)	(0.00)
Tangibility	−0.08***	−0.00*	−0.00***
	(0.03)	(0.00)	(0.00)
SOE	−10.94	−0.06	0.26**
	(7.79)	(0.24)	(0.10)
GDPpc	26.98***	0.34	−0.29*
	(8.85)	(0.30)	(0.17)
Sovereign rating	−8.75***	0.06	0.02
	(1.29)	(0.05)	(0.02)
KAOPEN	6.18	1.31**	−0.88**
	(21.15)	(0.67)	(0.42)
Governance	34.95**	−1.11**	0.23
	(14.98)	(0.47)	(0.23)
Creditor rights	−2.36**	0.08***	−0.01
	(0.94)	(0.02)	(0.01)
Constant	466.72***	0.26	4.84**
	(91.01)	(3.38)	(1.89)
Loan purpose FE	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	48,912	48,912	48,912
R-squared	0.493	0.254	0.655

This table presents the OLS regression results of loan spread, maturity, and loan size on NDB involvement. The dependent variables are All-in-Drawn spread in column 1, maturity in column 2, and log of facility amount in column 3. Definitions of the variables are provided in Appendix Table A1. Loan purpose dummies, currency dummies, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are corrected for heteroscedasticity, clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; ROA = return on assets; NWC = net working capital to total assets; GDPpc = GDP per capita; KAOPEN = capital account openness index; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

matches, we impose a tolerance level of 5 % on the maximum propensity score distance. Observations that are outside this range are dropped from the analysis.

We end up with a sample of 1,903 pairs of matched NDB and non-NDB loans (3,806 loans in total). Table 4 reports the regression results for the matched sample. The results are similar to those for the unmatched sample as NDB loans continue to be smaller, with longer maturity, and higher spread. In sum, the results in Table 4 show that our estimates of NDB effects are robust to endogeneity issues.

5.2.2. Treatment effects model

We estimate a treatment effects model with a two-step procedure (Maddala 1983). Our model of interest is:

$$Y_{l,f,i,c,t} = c + \alpha NDB_{l,t} + \theta' \boldsymbol{Loan}_{l,t} + \gamma' \boldsymbol{Firm}_{i,f,t-1} + \delta_i + \delta_c + \delta_t + \varepsilon_{f,l,i,c,t}$$

We omit borrower country–specific variables, which directly affect the choice of NDB. Since NDB is an endogenous variable, the binary decision of joining a syndicate is modeled as the outcome of an unobserved latent variable, NDB*, which is assumed as a linear function of exogenous covariates and a random component u.

$$NDB^*_{l,t} = c + \gamma' \boldsymbol{Firm}_{i,f,t-1} + \varphi' \boldsymbol{Country}_{c,t} + \delta_i + \delta_c + \delta_t + u_{f,l,i,c,t}$$

The observed outcome is modeled as.

$$NDB = \begin{cases} 1, if NDB^* > 0 \\ 0, otherwise \end{cases}$$

The key assumption is that u and ε follow a bivariate normal distribution with mean zero and covariance matrix:

$$\begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}$$

In the first stage, we use borrower characteristics and country-specific covariates to determine the participation of NDBs, controlling for industry, year, and country fixed effects. In the second stage, the model is augmented with a hazard variable estimated from the first stage. On top of the firm controls used in the first stage, we control for loan features in the second stage.

Table 5, column 1, presents the first-stage regression of the estimated determinants of NDB involvement. We find that large borrowers and firms with more tangible assets are more likely to become targets of NDBs. In addition, NDBs prefer borrowers headquartered in more advanced countries (which may probably borrow to invest in developing countries) with better sovereign ratings but poorer creditor rights. Columns 2 to 4 report the endogeneity-adjusted estimate of the NDB effect on loan spread, maturity, and size, respectively. Our findings still hold that NDB loans are smaller, with longer maturity, and higher spread. In sum, the estimation of the treatment effects model confirms the findings of the baseline model.

5.3. Robustness checks and subsample analyses

5.3.1. Robustness checks

To tackle the concern of omitted variable bias, we conduct a set of robustness checks. Panel A of Table 6 reports three robustness checks which include additional borrower or borrower country specific factors. First, apart from state ownership of firms, we extend the analysis by exploring the impact of politically-connected firms (PCFs) upon the syndicate formation and contract terms. We followed Delis et al. (2020) and obtained information on political connection from the NRG Metrics database. The NRG Metrics database offers director characteristics for each director of firms in 46 countries from 2007 to 2018. One dimension of director characteristics is whether he/she is politically connected. Political connection means that the director is a member of parliament, a minister, a member of party, or hold position in local authorities, or past position in government. We define a firm as a PCF, if at least one director is politically connected. We matched 2,145 borrowers from Dealscan with firms in the NRG Metrics database and then identified 458 politically connected firms. Controlling for the PCF dummy in the baseline regressions, we continue to find our main results in columns 1–3 of Panel A.

Second, political risk in the country where the borrower is located may play a role in shaping loan contract terms. We include the logarithm of political rating of the borrower country from the *International Country Risk Guide* (ICRG) as an additional control (Bekaert et al., 2014). The composite scores of political rating are scaled between 0 and 100, with 100 representing the least risk. Results in columns 4–6 in Panel A show that our main findings are largely unchanged.

Third, we add a rated firm dummy into the baseline regressions. It is a dummy variable equals to 1 if a borrower has a credit rating at loan origination, and 0 otherwise. We have collected issuers' credit rating information from SDC new bond issuance and Compustat North America Rating.[19] The results presented in the columns 7–9 in Panel A show that our main findings still hold when controlling for a dummy whether borrowers have a credit rating or not.

[19] SDC reports the Moody and S&P credit rating of at bond issuance for global issuers. We match SDC issuers with Dealscan/Compustat borrowers using *tickers* as identifiers. We supplement SDC credit rating with Compustat North America Rating using *gvkey* as identifiers, which reports S&P rating for firms in North America. The matched sample is slightly smaller than the one in most analyses since some borrowers cannot be matched with either Compustat rating or SDC.

Table 4
Propensity score matching.

	Loan spread (1)	Maturity (2)	Loan size (3)
NDB	11.78**	0.64***	−0.12*
	(4.63)	(0.19)	(0.07)
Constant	44.54	4.32	7.01***
	(140.28)	(6.14)	(2.68)
Loan controls	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	3,806	3,806	3,806
R-squared	0.507	0.192	0.693

This table reports baseline regression results on a propensity score matched sample. The dependent variables are loan spread, maturity, and loan size. Definitions of the variables are provided in Appendix Table A1. Loan controls, firm controls, borrower country controls, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Next, we consider whether the financial support by the government in the country of lenders influences lenders' refinancing conditions and thereby loan contract terms. To measure the financial support by the government, we follow Demirgüç-Kunt and Huizinga (2013) and use the fiscal balance of the lenders' home country.[20] The rationale is that a country's ability to bail out its banks should depend on the health of its public finances. Fiscal balance is the ratio of central government revenues minus expenses to GDP. The data comes from the World Bank's World Development Indicators and IMF's Government Finance Statistics. We calculate the fiscal balance at the facility level using the average of all lenders. Columns 1–3 in Panel B of Table 6 reports the baseline regressions controlling for fiscal balance of lenders' home country. Our main findings continue to hold.

Alternatively, we rely on support rating of banks to directly measure the financial support to lenders in potential crisis. We have manually collected banks' support rating from Fitch, which is defined as the agency's assessment on the likelihood of extraordinary support from controlling shareholders or the national authorities in case of need. This rating is on a five-point scale, with "1″ representing an extremely high probability of support, and "5" indicating that support cannot be relied on. We calculate the support rating at the facility level using the average of all lenders. Columns 4–6 of Panel B show that our main findings remain intact when including Fitch's support rating.

Last but not the least, we further control for country*year, industry*year, and country*industry fixed effects to absorb time varying country-specific shocks, time-varying industry dynamics, and country-industry heterogeneities. The results presented in the columns 7–9 in Panel B of Table 6 show that our conclusions are insensitive to the inclusion of various fixed effects.

5.3.2. Subsample analyses

We test the robustness of our main findings by conduct a battery of subsample analyses in Table 7. First, we verify whether our findings are primarily driven by the overrepresentation of the U.S. market. As most of the borrowers listed in Dealscan are publicly held companies, which are required to file with the Securities and Exchange Commission, our sample is inevitably biased toward U.S. borrowers. Loans taken by U.S. borrowers account for more than two-thirds of the entire sample. Hence, we re-estimate the baseline regression with a subsample excluding U.S. borrowers. The results in columns 1–3 of Panel A of Table 7 remain qualitatively unaltered.

Second, we examine the subsample of cross-border loans. A syndicated loan facility is classified as a *foreign loan* if all lead banks are from countries that differ from the borrower's country. Alternatively, it is classified as a *domestic loan* if all lead banks are from the borrower's country. The remaining loan facilities, where some of the lenders are from the borrower's country and others are not, are classified as *mixed loans*. Both foreign loans and mixed loans are called *cross-border loans*. Our sample consists of 31,105 domestic loans, and 17,807 cross-border loans (5,295 foreign loans and 12,512 mixed loans). Columns 4–6 in Panel A, reports analogous analysis to that of Gurara et al. (2020) on MDBs. We find that cross-border loans with NDBs are comparably smaller, have longer maturity, and are required to have a higher spread relative to those entirely financed by profit-driven lenders.

Third, we check whether our results vary when distinguishing NDBs as lead banks from NDBs as participants. According to the summary statistics in Table 1, panel C, NDBs lead in 50 % of the deals, while NDBs participate in 54 % of the cases, with the remaining 4 % where NDBs both lead and participate. The role of NDBs in the syndicate may be relevant for loan contracting. As a lead bank, an NDB may set the basic structure of the syndicate contract and then invite qualified banks and

[20] In unreported tests, we also control for public debt of the lenders' home country which measure the capability of financial support by the governments. Public debt is central government debt divided by GDP. When including public debt into the baseline regressions, our main findings remain intact.

Table 5
Treatment effects model.

	NDB (1)	Loan spread (2)	Maturity (3)	Loan size (4)
NDB		30.85***	0.54**	−2.41***
		(11.34)	(0.23)	(0.09)
Firm size	0.12***	−8.08***	−0.00	0.43***
	(0.01)	(0.37)	(0.01)	(0.00)
Leverage	−0.00	0.72***	0.01***	0.00***
	(0.00)	(0.02)	(0.00)	(0.00)
Profit Margin	−0.00***	−0.41***	−0.00**	−0.00**
	(0.00)	(0.03)	(0.00)	(0.00)
ROA	0.00**	−1.64***	0.02***	0.02***
	(0.00)	(0.06)	(0.00)	(0.00)
NWC	−0.00	−0.44***	0.01***	−0.00***
	(0.00)	(0.03)	(0.00)	(0.00)
Tangibility	0.00***	−0.08***	−0.00***	−0.00***
	(0.00)	(0.01)	(0.00)	(0.00)
SOE	0.13	−11.43**	0.03	0.36***
	(0.08)	(5.39)	(0.11)	(0.06)
GDPpc	0.22**			
	(0.10)			
Sovereign rating	0.04***			
	(0.01)			
KAOPEN	0.44*			
	(0.23)			
Governance	−0.04			
	(0.18)			
Creditor rights	−0.03**			
	(0.01)			
Constant	−5.66***	706.30***	4.43***	0.45
	(1.02)	(28.98)	(0.58)	(0.31)
hazard lambda		−7.54	−0.01	1.10***
		(5.60)	(0.11)	(0.04)
Loan controls	No	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	48,912	48,912	48,912	48,912

This table reports the results of two stages of a treatment effects model. The first stage models the determinants of NDB involvement in column 1, while the second stage models the effect of NDBs on loan spread, maturity, and loan size in columns 2 to 4. Definitions of the variables are provided in Appendix Table A1. Loan controls and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; ROA = return on assets; NWC = net working capital to total assets; GDPpc = GDP per capita; KAOPEN = capital account openness index; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

accredited investors as participants (Standard & Poor's, 2014). In this case, the terms and conditions may be better in line with the NDBs' strategy. By contrast, if an NDB is invited to join a syndicate led by a commercial bank, it may not set the agenda but instead follow the setting of the proposed plan. To test whether NDBs as lead or participant banks have differentiated effects on contract terms, we include a dummy for NDBs as lead banks and another for NDBs as participants. Columns 1–3 in Panel B of Table 7 show that the contract terms of loans with NDBs as lead banks and participants exhibit a similar robust pattern as in our baseline analysis, that is, NDB loans have higher spreads, longer maturity, and smaller amounts. This finding indicates that the effect of an NDB's involvement on loan terms is independent of its role in the syndicate.

Fourth, we distinguish NDBs in HICs from those in MICs. As the majority of NDBs are in HICs, as shown in the Table 1, panel C, we examine whether NDBs in HICs are driving the overall patterns. We follow the World Bank's classification of income groups. We find similar patterns in Panel B of Table 7, columns 4 to 9, in line with the baseline regression of all NDBs. Furthermore, NDBs in MICs have stronger effects on contract terms, as the absolute value of the coefficient is larger for NDBs in MICs than those in HICs.

5.4. Horse race tests: NDBs, MDBs, or SOBs?

In our analysis, we have distinguished between NDB loans versus non-NDB loans. Yet, loans with NDB participation may have other lenders involved that have similar mandates or missions as NDBs, for instance, MDBs (Gurara et al., 2020) or state-owned commercial banks (Fotak and Lee, 2020; Borisova et al., 2015). To test whether the impact of NDBs identified

Table 6
Robustness checks.

Panel A	Political connection			Political risk			Rated firm dummy		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)	Loan spread (7)	Maturity (8)	Loan size (9)
NDB	17.97**	0.50*	−0.30***	16.31***	0.39***	−0.24***	11.27**	0.26*	−0.18**
	(6.99)	(0.29)	(0.09)	(3.82)	(0.13)	(0.06)	(5.45)	(0.16)	(0.08)
PCF	−2.28	−0.03	0.05						
	(3.89)	(0.07)	(0.04)						
Political rating				−204.73***	3.78***	1.38**			
				(37.84)	(0.77)	(0.54)			
Rated firm dummy							−3.54	0.06	0.12***
							(2.52)	(0.04)	(0.03)
Constant	910.07***	14.87**	−2.06	1364.11***	−16.00***	−0.92	516.16***	−14.37*	0.33
	(254.59)	(6.87)	(4.03)	(189.49)	(4.96)	(3.02)	(198.24)	(7.50)	(3.80)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	12,465	12,465	12,465	48,889	48,889	48,889	34,713	34,713	34,713
R-squared	0.524	0.261	0.622	0.494	0.255	0.655	0.509	0.269	0.678
Panel B	Financial support of lenders' government			Fitch's support rating			Various FEs		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)	Loan spread (7)	Maturity (8)	Loan size (9)
NDB	14.32***	0.26**	−0.31***	15.31***	0.40***	−0.21***	14.16***	0.50***	−0.23***
	(3.97)	(0.11)	(0.06)	(3.86)	(0.12)	(0.06)	(3.65)	(0.12)	(0.06)
Fiscal balance	0.23	−0.01	0.02**						
	(0.60)	(0.01)	(0.01)						
Fitch support rating				1.99**	0.01	−0.09***			
				(0.98)	(0.01)	(0.01)			
Constant	438.34***	−2.87	4.54**	484.31***	−0.88	5.59***	630.47***	3.74***	1.33***
	(94.70)	(3.40)	(2.02)	(91.30)	(3.54)	(2.02)	(20.08)	(0.08)	(0.11)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Borrower country*Year FE	No	No	No	No	No	No	Yes	Yes	Yes
Industry*Year FE	No	No	No	No	No	No	Yes	Yes	Yes
Borrower country*Industry FE	No	No	No	No	No	No	Yes	Yes	Yes
N	48,213	48,213	48,213	36,189	36,189	36,189	48,711	48,711	48,711
R-squared	0.496	0.268	0.645	0.511	0.253	0.580	0.526	0.228	0.683

This table reports results for robustness checks. The dependent variables are loan spread, maturity, and loan size. In Panel A, we control for political connection of borrowers in columns 1–3, political risk of the borrower's country in columns 4–6, and whether the borrower has a credit rating in columns 7–9. In Panel B, we control for the financial support by the government of the lenders' country, measured by the fiscal balance of lenders' country in columns 1–3. In addition, we control for the syndicate average of Fitch's support rating of all lenders in columns 4–6. Last, we include country*year, industry*year, and country*industry fixed effects in columns 7–9. Definitions of the variables are provided in Appendix Table A1. Loan controls, firm controls, borrower country controls, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity (except for columns 7–9 in Panel B). Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; PCF = Politically connected firms; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

earlier may be attributed to the participation of other similar co-lenders, we conduct a horse race test to compare the effects of NDBs with those of MDBs and SOBs in a joint regression.

We first match lenders in the Dealscan sample with our list of DFIs. Only 88 loans in our final sample have at least one MDB involved. Despite the low fraction of MDBs, we nonetheless include an MDB dummy in the baseline regression and conduct a horse race test. If the effect of NDBs is driven by MDBs, we would expect to see an insignificant estimate for NDBs and significant estimates for MDBs. The first three columns in Table 8 show that the effect of NDB participation on the loan contract terms remains the same after including MDBs. In addition, syndicated loans with MDB participation have longer maturity and smaller amounts, but the higher pricing effect is not statistically significant. This result differs slightly from that of Gurara et al. (2020), as the data on syndicated loans with MDB participation are patchier in Dealscan than in Dealogic Loan Analytics.

Table 7
Subsample analysis.

Panel A	Non-US			Cross-border loans		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)
NDB	13.91***	0.59***	−0.24***	12.72***	0.41***	−0.20***
	(4.58)	(0.17)	(0.06)	(4.23)	(0.13)	(0.06)
Constant	469.07***	−0.89	5.94***	658.21***	3.09	2.88***
	(88.41)	(3.06)	(1.66)	(95.72)	(2.66)	(1.11)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	10,847	10,847	10,847	17,806	17,806	17,806
R-squared	0.502	0.171	0.675	0.528	0.243	0.571

Panel B	Lead or participant			NDB from HICs			NDB from MICs		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)	Loan spread (7)	Maturity (8)	Loan size (9)
NDB lead bank	15.35***	0.45**	−0.26***						
	(5.37)	(0.20)	(0.09)						
NDB participant	14.98***	0.45**	−0.26***						
	(4.81)	(0.18)	(0.07)						
NDB (high income country)				10.99***	0.47***	−0.22***			
				(3.92)	(0.15)	(0.06)			
NDB (middle income country)							46.29***	0.55**	−0.41***
							(13.31)	(0.22)	(0.15)
Constant	466.69***	1.02	4.81**	461.00***	0.89	4.90***	472.28***	0.86	4.85**
	(90.99)	(3.28)	(1.88)	(91.66)	(3.26)	(1.89)	(89.97)	(3.30)	(1.91)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	48,912	48,912	48,912	48,912	48,912	48,912	48,912	48,912	48,912
R-squared	0.493	0.150	0.655	0.493	0.150	0.655	0.493	0.149	0.655

Panel A presents the results for baseline regression in a subsample excluding U.S. borrowers in columns 1–3, and the results for the baseline regression for a subsample of cross-border loans only in columns 4–6. Panel B examines various roles of NDBs. Columns 1 to 3 present the results for the regressions that distinguish NDBs as lead banks from those as participants. Columns 4 to 9 present the results for the regressions that distinguish NDBs in high-income countries (HICs) from those in middle-income countries (MICs). The dependent variables are loan spread, maturity, and loan size. Definitions of the variables are provided in Appendix Table A1. Loan controls, firm controls, borrower country controls, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; HIC = high-income country; MIC = middle-income country; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

We further follow Fotak and Lee (2020) and identify lenders with government ownership using the information from Dealscan. The database identifies firms as being majority (more than 50 %) or minority (between 5 % and 50 %) government owned. We focus on majority ownership and identify any lender in which the government owns, directly or indirectly, more than 50 % of the equity. We create an SOB dummy that equals 1 if a loan involves at least one state-owned commercial bank and 0 otherwise. Again, we include the SOB dummy in the horse race test. The results are reported in the last three columns in Table 8. The findings for NDBs and MDBs are unaltered. Loans with SOBs do not show any significant pattern in maturity or pricing. In summary, our findings indicate that NDBs behave differently from SOBs in the syndicated loan market.

5.5. Heterogeneous borrowers

In this subsection, we take a step further to examine the impact of NDB participation on the loan contract terms of heterogeneous borrowers. In particular, we exploit borrower heterogeneity in financial constraint, information asymmetry, whether borrowers are in the infrastructure sector, and country-specific risk.

5.5.1. Financial constraint and information asymmetry of borrowers

NDBs are expected to help financially constrained and informationally opaque borrowers, as these borrowers are often underserved in the commercial banking system. Therefore, we test whether the loan terms vary across different types of borrowers in the dimensions of financial constraint and information opacity.

Table 8
NDBs, MDBs, or SOBs?

	MDB			MDB + SOB		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)
NDB	16.57***	0.52***	−0.24***	16.67***	0.48***	−0.20***
	(3.85)	(0.14)	(0.06)	(3.99)	(0.14)	(0.05)
MDB	1.08	1.59**	−0.43***	1.14	1.58**	−0.41***
	(23.36)	(0.64)	(0.14)	(23.29)	(0.64)	(0.14)
SOB				−0.30	0.08	−0.12***
				(3.17)	(0.09)	(0.05)
Constant	466.54***	0.78	4.91***	466.51***	0.79	4.89***
	(91.16)	(3.28)	(1.88)	(91.18)	(3.28)	(1.88)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	48,912	48,912	48,912	48,912	48,912	48,912
R-squared	0.493	0.151	0.655	0.493	0.151	0.655

This table examines the impact of NDBs, MDBs, and SOBs on loan terms. We control for the MDB dummy in columns 1 to 3. In addition, we add the SOB dummy in columns 4 to 6. The dependent variables are loan spread, maturity, and loan size. Definitions of the variables are provided in Appendix Table A1. Loan controls, firm controls, borrower country controls, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; MDB = multilateral development bank; SOB = state-owned commercial bank; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

We measure financial constraint using Whited and Wu's (2006) WW index and a no-dividend dummy (Farre-Mensa and Ljungqvist, 2016). The WW index is based on the coefficients obtained from a structural model in Whited and Wu (2006). The index is effectively measured as the projection of the shadow price of raising equity capital onto the following variables: cash flow to assets (with a negative loading), a dummy capturing whether the firm pays a dividend (negative), long-term debt to total assets (positive), size (negative), sales growth (negative), and industry sales growth (positive). Firms above the median index values in the previous year of the Compustat universe are coded as constrained, and those below the median are coded as unconstrained. In addition, we classify firms as constrained based on whether they lack a history of paying dividends, for which the no-dividend dummy equals 1 and 0 otherwise. To measure the information opacity of borrowers, we follow Bharath et al. (2011) and adopt firm size.

The first three columns of Panel A in Table 9 report regressions using the WW index as a proxy for financial constraints. The positive and significant estimate for the interaction term of the NDB dummy and WW in column 3 suggests that financially constrained firms could benefit from larger loans by NDBs. This finding has been corroborated by the regression in column 6 which uses no dividend as an alternative measure for financial constraint. In addition, we find some evidence that NDBs even lower loan spreads for financially constrained firms that never pay dividends. The regression in column 9 confirms that NDBs support informationally opaque borrowers and offer larger loans. Yet, there is no significant difference in terms of maturity.

5.5.2. Infrastructure projects

Promoting infrastructure financing is one of the primary missions of many NDBs. Therefore, we investigate whether the impact of NDBs on loan terms differs for firms in the infrastructure sector compared with those in other sectors. We restrict the infrastructure sector to firms operating in transportation, communications, electricity, gas, and sanitation services.

In Table 9, Panel B, we interact the NDB dummy with the infrastructure dummy and report regression output in the first three columns. We find that albeit NDBs in general tend to extend small loans, the loans to the infrastructure sector are large. In addition, long maturity is pronounced for loans to borrowers in the infrastructure sector. These results suggest that NDBs are pivotal in infrastructure financing as they tend to provide large-scale and long-term capital.

5.5.3. Borrower country heterogeneity: institutional quality and creditor rights

NDBs are expected to play a vital role in countries that have low institutional quality and low creditor rights, where private lenders are reluctant to enter the market as risks are often misperceived in these countries. We use the average of six dimensions of the Worldwide Governance Indicators to measure institutional quality, and we use creditor rights from Djankov et al. (2007) and the World Bank's Doing Business survey to measure the risk of the borrower country (Bae and Goyal, 2009).

Table 9, Panel B, shows the augmented baseline regressions, which include the interaction term of the NDB dummy and the low institutional quality/creditor rights dummy in columns 4–9. The results in column 4 suggest that the loan spreads are lower in countries with weak governance, suggesting that the involvement of NDBs at least partly addresses the concerns of other lenders. In addition, the results of loan size regressions in column 6 and 9 show that NDBs tend to issue larger loans to borrowers in countries that are perceived to be risky in terms of institutional quality or creditor rights.

Table 9
Firm heterogeneity.

Panel A	WW			No dividend			Small firms		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)	Loan spread (7)	Maturity (8)	Loan size (9)
NDB	12.44**	0.15	−0.09	16.86***	0.37**	−0.26***	10.60**	0.24	−0.50***
	(5.80)	(0.18)	(0.09)	(4.28)	(0.17)	(0.07)	(4.85)	(0.18)	(0.07)
WW	0.48	0.19***	0.01						
	(3.76)	(0.06)	(0.04)						
NDB*WW	0.11	−0.35	0.26***						
	(6.49)	(0.24)	(0.09)						
No dividend				22.50***	0.06	−0.08***			
				(2.23)	(0.04)	(0.02)			
NDB*No dividend				−22.92**	0.14	0.28**			
				(10.29)	(0.24)	(0.12)			
Small firms							12.24***	0.11**	−0.16***
							(2.51)	(0.04)	(0.04)
NDB*Small firms							11.23	0.27	0.52***
							(7.49)	(0.22)	(0.10)
Constant	555.21***	−2.61	3.91*	523.97***	0.23	6.68***	428.07***	−0.04	5.44***
	(100.33)	(3.30)	(2.00)	(102.90)	(5.03)	(2.48)	(90.41)	(3.39)	(1.90)
N	29,284	29,284	29,284	37,836	37,836	37,836	48,912	48,912	48,912
R-squared	0.499	0.251	0.642	0.503	0.254	0.673	0.494	0.254	0.656
Panel B	Infrastructure			Governance			Creditor rights		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)	Loan spread (7)	Maturity (8)	Loan size (9)
NDB	19.31***	0.30*	−0.32***	26.92***	0.37*	−0.36***	18.38***	0.61***	−0.33***
	(4.63)	(0.16)	(0.07)	(5.01)	(0.20)	(0.08)	(5.63)	(0.21)	(0.09)
NDB*Infrastructure	−8.72	0.70**	0.26**						
	(7.71)	(0.34)	(0.12)						
Low governance				−14.27***	0.82***	−0.11			
				(5.18)	(0.12)	(0.08)			
NDB*Low governance				−17.39**	0.25	0.20*			
				(7.23)	(0.25)	(0.11)			
Low creditor rights							−6.18	0.64***	−0.02
							(9.26)	(0.16)	(0.12)
NDB*Low creditor rights							−3.84	−0.21	0.19*
							(7.01)	(0.25)	(0.11)
Constant	465.90***	1.09	4.86**	495.22***	−0.53	5.07***	478.02***	0.22	4.74**
	(90.89)	(3.20)	(1.90)	(92.35)	(3.29)	(1.93)	(91.76)	(3.28)	(1.89)
N	48,912	48,912	48,912	48,912	48,912	48,912	48,912	48,912	48,912
R-squared	0.493	0.151	0.655	0.494	0.152	0.655	0.493	0.151	0.655
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel A of this table examines the impact of NDB participation on loan terms, conditional on financial constraint and information opacity. We use the WW index in columns 1–3, no dividend dummy in columns 4–6, and small firms dummy in columns 7–9. Panel B examines whether NDBs' lending differs between the infrastructure sector and other sectors in columns 1–3, and whether NDB lending depends on institutional quality of governance in columns 4–6, and creditor rights in columns 7–9. The dependent variables are loan spread, maturity, and loan size. Definitions of the variables are provided in Appendix Table A1. Loan controls, firm controls, borrower country controls, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; WW = Whited and Wu's index (2006); FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

5.6. Countercyclical lending

In this subsection, we explore whether NDBs play a countercyclical role during global liquidity cycles. In particular, we examine whether NDBs may better support low-quality borrowers during the U.S. monetary policy cycles and domestic borrowers in times of crises.

5.6.1. Evidence of countercyclical lending

We adopt three measures of cycles. First, we use the effective federal funds rate from St. Louis Fed as a measure for the stance of U.S. monetary policy (Avdjiev and Hale, 2019). Second, following Giannetti and Laeven (2012a), we use a dummy for systemic banking crises from Laeven and Valencia (2013, 2020). Third, we define economic recession as a dummy variable which is equal to 1 if the country has a negative growth rate in real GDP in a given year, and 0 otherwise. To examine the procyclical properties of NDBs' lending, we interact the NDB dummy with three measures of cycles.

Table 10
Countercyclical lending.

Panel A	U.S. Monetary policy			Banking crisis			Recession		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)	Loan spread (7)	Maturity (8)	Loan size (9)
NDB	25.72***	0.67***	−0.41***	19.46***	0.35***	−0.28***	18.04***	0.44***	−0.27***
	(6.18)	(0.23)	(0.09)	(4.08)	(0.13)	(0.06)	(3.97)	(0.14)	(0.06)
Fed funds rate	−8.26***	0.13***	0.04***						
	(1.60)	(0.03)	(0.02)						
NDB*Fed funds rate	−3.72**	−0.07	0.07***						
	(1.56)	(0.06)	(0.02)						
Banking crisis				2.80	−0.09	−0.16***			
				(4.62)	(0.12)	(0.06)			
NDB*Banking crisis				−18.63*	0.18	0.27*			
				(10.56)	(0.36)	(0.14)			
Recession							22.45***	−0.54***	−0.19**
							(5.90)	(0.16)	(0.08)
NDB*Recession							−22.08*	−0.53	0.41***
							(11.78)	(0.35)	(0.13)
Constant	511.79***	0.97	4.35**	464.39***	0.45	5.18***	452.07***	0.63	4.96***
	(90.78)	(3.23)	(1.85)	(91.18)	(3.46)	(1.89)	(90.37)	(3.41)	(1.89)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	48,912	48,912	48,912	48,912	48,912	48,912	48,912	48,912	48,912
R-squared	0.494	0.151	0.655	0.493	0.254	0.655	0.494	0.255	0.655

Panel B	Secured			High yield		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)
NDB	38.90***	0.39	−0.28***	14.22***	0.69***	−0.38***
	(7.52)	(0.27)	(0.10)	(2.73)	(0.24)	(0.09)
Fed funds rate	−7.89***	0.13***	0.07***	−0.05	0.15***	0.03*
	(1.61)	(0.03)	(0.02)	(0.33)	(0.03)	(0.02)
NDB*Fed funds rate	−4.03**	−0.11*	0.02	−4.62***	−0.03	0.07***
	(1.77)	(0.06)	(0.03)	(0.75)	(0.06)	(0.03)
NDB*Secured	−47.02***	0.94**	−0.37**			
	(16.40)	(0.45)	(0.18)			
Fed funds rate*Secured	−0.87	0.01	−0.06***			
	(0.62)	(0.01)	(0.01)			
NDB*Fed funds rate*Secured	0.84	0.20	0.14***			
	(4.27)	(0.13)	(0.05)			
High yield				0.98***	0.00***	−0.00***
				(0.00)	(0.00)	(0.00)
NDB*High yield				0.03*	0.00	−0.00
				(0.02)	(0.00)	(0.00)
Fed funds rate*High yield				−0.00**	0.00***	−0.00***
				(0.00)	(0.00)	(0.00)
NDB*Fed funds rate*High yield				−0.02***	0.00	0.00*
				(0.01)	(0.00)	(0.00)
Constant	510.57***	−1.36	4.18**	−42.34	−0.10	5.25***
	(91.12)	(3.24)	(1.85)	(65.53)	(3.29)	(1.82)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	48,912	48,912	48,912	48,912	48,912	48,912
R-squared	0.495	0.190	0.657	0.969	0.164	0.665

Panel C	Banking crisis			Recession		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)
NDB	15.26***	0.10	−0.23***	14.65***	0.28*	−0.24***
	(4.37)	(0.13)	(0.07)	(4.36)	(0.15)	(0.07)

(*continued on next page*)

Table 10 (*continued*)

Panel C	Banking crisis			Recession		
	Loan spread (1)	Maturity (2)	Loan size (3)	Loan spread (4)	Maturity (5)	Loan size (6)
Domestic loans	−10.71***	−0.18***	−0.21***	−10.65***	−0.15***	−0.23***
	(2.18)	(0.04)	(0.02)	(2.07)	(0.03)	(0.02)
NDB*Domestic loans	14.31	0.84**	−0.13	11.67	0.55*	−0.07
	(9.39)	(0.33)	(0.13)	(8.90)	(0.32)	(0.13)
Banking crisis	2.91	−0.16	−0.05			
	(5.19)	(0.13)	(0.07)			
NDB*Banking crisis	−11.85	0.69	0.05			
	(12.78)	(0.46)	(0.16)			
Banking crisis*Domestic loans	0.73	0.14*	−0.16***			
	(4.18)	(0.08)	(0.04)			
NDB*Banking crisis*Domestic loans	−25.33	−1.72***	0.62**			
	(19.72)	(0.66)	(0.28)			
Recession				23.33***	−0.56***	−0.01
				(6.98)	(0.18)	(0.09)
NDB*Recession				−19.98	−0.56	0.16
				(13.99)	(0.41)	(0.15)
Recession*Domestic loans				−0.71	0.05	−0.31***
				(7.54)	(0.16)	(0.08)
NDB*Recession*Domestic loans				−11.36	0.43	0.57**
				(26.60)	(0.73)	(0.24)
Constant	468.19***	1.00	4.86***	455.27***	0.99	4.66**
	(90.82)	(3.44)	(1.82)	(89.99)	(3.40)	(1.82)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	48,912	48,912	48,912	48,912	48,912	48,912
R-squared	0.494	0.255	0.658	0.494	0.256	0.658

This table examines the countercyclical lending of NDBs. Panel A evaluates NDBs' lending during U.S monetary policy cycles, economic recessions, and banking crises. Panel B examines whether NDBs' countercyclical lending is more pronounced for low-quality borrowers. Panel C examines whether NDBs' countercyclical lending is more pronounced for domestic loans. The dependent variables are loan spread, maturity, and loan size. Definitions of the variables are provided in Appendix Table A1. Loan controls, firm controls, borrower country controls, and industry, borrower country, and year fixed effects are included but their estimates are suppressed for brevity. Robust standard errors are clustered at the borrower level and reported in parentheses below the coefficient estimates. NDB = national development bank; FE = fixed effects.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A of Table 10 reports the tests of countercyclical lending. In column 3, we find that the interaction term of NDB and federal funds rate is positive and significant. This suggests that NDBs increase the average loan size when U.S. monetary policy tightens as measured by higher federal funds rate. In addition, the regression result in column 1 suggests that NDBs also offer favorable terms by lowering loan rates in times of the tightening of the U.S. monetary policy, as indicated by the negative and significant interaction term of NDB and federal funds rate. In columns 4–6, we confirm that NDBs tend to make larger loans and charge lower rates during banking crises. In columns 7–9, we find similar effects during economic downturns. In sum, we find strong evidence that NDBs lend countercyclically. One potential explanation of why NDBs act countercyclically is that their objective is not to maximize profits as private commercial banks do, but to stabilize and promote the recovery of the economy (Brei and Schclarek, 2015, 2018). Another potential explanation is that NDBs primarily rely on national governments to raise funds to finance their operations; hence, they are less prone to procyclical trends in international credit markets (Xu et al., 2021b), since the existing studies show that domestic banks are more likely to transmit global liquidity shocks to local credit markets if their funding is more exposed to international credit markets (DiGiovanni, et al., 2022; Sarmiento, 2022).

5.6.2. Low-quality versus high-quality borrowers

The existing literature shows that commercial banks tend to reduce their lending to low-quality (or risky) borrowers when the U.S. monetary policy tightens (Bräuning and Ivashina, 2020). To explore whether NDBs play a countercyclical role in increasing their average loan size to low-quality borrowers that often suffer more from the procyclical lending by commercial banks, we examine the lending to borrowers of different qualities over the U.S. monetary policy cycle. In specific, we add a triple interaction of the NDB dummy, federal funds rate, and risky firm variables. To measure the quality of borrowers, we have followed Bernanke et al. (1996) and Bräuning and Ivashina (2020) to define risky firms with high agency cost as those with secured loans (secured dummy = 1) / those with high loan spread to average rate in country-year (High yield = All-in-Drawn spread minus the average All-in-Drawn spread in the country of the borrower in a given year).

In Panel B of Table 10, we use the secured dummy in columns 1–3, and high yield in columns 4–6. In the loan size regression in column 3, the interaction term of federal funds rate and secured dummy is negative and significant, suggesting that commercial banks reduce lending to risky firms when U.S. monetary policy tightens. By contrast, the triple interaction term is positive and significant, suggesting NDBs expand the average size of lending to risky firms in a tightening monetary policy environment. The robustness check in columns 4–6 using high yield also confirms that NDBs tend to boost their support for low-quality firms that are prone to the shrinking financial support from commercial banks. This evidence of countercyclical lending by NDBs further confirms that NDBs are complementary to commercial banks.

5.6.3. Domestic versus cross-border lending

To examine whether NDBs may bolster their support for domestic loans in times of crises compared with commercial banks, we add a triple interaction term of the NDB participation, the crisis dummy, and the domestic loan dummy.

Columns 1–3 in the Panel C of Table 10 report the baseline regressions which adopt banking crises as a proxy for abrupt changes in liquidity conditions. In the loan size regression in column 3, the interaction term of banking crises and domestic loan dummy is negative and significant, suggesting that commercial banks reduce their average loan size during banking crises. By contrast, the positive and significant estimate of the triple interaction term suggests that NDBs increase the average lending amount to domestic firms, relative to foreign borrowers, during banking crises. This suggests that NDBs play a countercyclical role in boosting their support for domestic firms that may suffer from procyclical lending by commercial banks in times of crises. Our result still holds, when we use recessions as a proxy for changes in liquidity conditions in columns 4–6 as seen in the positive and significant estimate of the triple interaction term in column 6.

In short, as public policy tools deployed by governments, NDBs can play a countercyclical role in bolstering their support for domestic firms to compensate for the procyclical lending by commercial banks during global liquidity cycles.

6. Conclusion

Building on a novel, manually-collected database on NDBs worldwide, our paper is the first comprehensive empirical analysis that examines the effect of NDB participation on loan contract terms in the global syndicated loan market. Our findings suggest that syndicated loans with NDB participation in general are associated with higher loan spreads, longer maturity, and smaller loan size. Our results hold after employing the propensity score matching technique and the treatment effects model to address the potential endogenous formation of syndicate structures with NDB participation. We conducted horse race tests to rule out the hypothesis that the longer maturities and higher spreads are driven by the participation of other financial institutions, such as MDBs and SOBs. In addition, by conducting the tests on a sample of heterogeneous borrowers, we discovered that NDBs tend to provide financial support for financially constrained and informationally opaque borrowers, and borrowers in countries with poor institutional quality or creditor rights. Finally, we find that NDBs play a countercyclical role during global liquidity cycles.

Based on the robust empirical analysis, we draw the policy implication that NDBs may incentivize profit-driven commercial banks in the loan syndication to fill market gaps. Specifically, syndicated loans with NDB participation are more likely to venture into long-term and high-risk investment projects that may go beyond the risk appetite of profit-maximizing commercial banks, provide financial support for financially constrained borrowers, and act in a countercyclical manner during global liquidity cycles.

CRediT authorship contribution statement

Di Gong: Methodology, Formal analysis, Writing – review & editing. **Jiajun Xu:** Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Supervision, Funding acquisition. **Jianye Yan:** Methodology, Validation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We are grateful to Thorsten Beck, Bing Han, Kewei Hou, Haoyun Gao, Justin Yifu Lin, and participants at the virtual American Economic Association (AEA) annual conference 2021, the 2019 INSE Faculty Retreat, 2020 UIBE Summer Finance Workshop, and 2020 NSE conference for valuable comments and suggestions. This research has been supported by the National Natural Science Foundation of China (No. 71803022, 72273026), "the Fundamental Research Funds for the Central Universities" in UIBE (CXTD13-05), National Social Science Foundation (17BJL124, 20BJL021), Ford Foundation (128664, 135168, 139355), and the National Natural Science Foundation of China – Data Center for Management Science at Peking University (2017KEY06).

Appendix

Table A1
Variable definitions.

Variable	Description	Source
Loan variables		
NDB	Dummy variable, equals 1 if at least one lender is an NDB.	Dealscan, DFI database
NDB from HICs	Dummy variable, equals 1 if at least one lender is an NDB in a high-income country.	Dealscan, DFI database
NDB from MICs	Dummy variable, equals 1 if at least one lender is an NDB in a middle-income country.	Dealscan, DFI database
NDB lead	Dummy variable, equals 1 if at least one lead arranger is an NDB.	Dealscan, DFI database
NDB participant	Dummy variable, equals 1 if at least one participant is an NDB.	Dealscan, DFI database
MDB	Dummy variable, equals 1 if at least one lender is an MDB.	Dealscan, DFI database
SOB	Dummy variable, equals 1 if at least one lender is an SOB.	Dealscan
Loan spread	The All-in-Drawn spread is an interest rate spread over LIBOR measured in basis points for each dollar drawn from the loan.	Dealscan
Loan size	Logarithm of facility amount in millions of US$.	Dealscan
Maturity	Maturity of the facility (years).	Dealscan
No. of lenders	Number of lenders in a facility of a syndicated loan deal.	Dealscan
No. of facilities	Number of facilities (tranches) in a syndicated loan deal.	Dealscan
Revolver	Dummy variable, equals 1 for lines of credit.	Dealscan
Term loan	Dummy variable, equals 1 for term loans.	Dealscan
Senior	Dummy variable, equals 1 for senior loans.	Dealscan
Secured	Dummy variable, equals 1 for loans with collateral.	Dealscan
Covenant	Covenant intensity index in Bradley and Roberts (2015), ranging from zero to six, with high values indicating high covenant intensity. It is constructed by adding the indicator variables for dividend restriction, equity sweep, asset sweep, debt sweep, securitization, and a binary variable that is one if the contract includes two or more financial covenants.	Dealscan
Fiscal balance	Ratio of central government revenues minus expenses to GDP. We calculate the fiscal balance at the facility level using the average of all lenders.	WDI, IMF's Government Finance Statistics
Support rating	The agency's assessment on the likelihood of external support from controlling shareholders or the national authorities in case of need. This rating is on a five-point scale, with "1" representing an extremely high probability of support, and "5" indicating that support cannot be relied on. We calculate the support rating at the facility level using the average of all lenders.	Fitch
High yield	All-in-Drawn spread minus the average All-in-Drawn spread in the country of the borrower.	Dealscan, authors' calculation
Firm variables		
Firm size	Logarithm of the firm's total assets in thousands of US$.	Compustat
Leverage	Firm leverage defined as the sum of long-term and short-term debts over total assets of the borrower.	Compustat
Profit Margin	Profit margin over sales of the borrower.	Compustat
ROA	Return on assets of the borrower.	Compustat
NWC	Net working capital over total assets of the borrower.	Compustat
Tangibility	Tangible assets over total assets of the borrower.	Compustat
SOE	Dummy variable that is equal to 1 for state-owned firms and 0 otherwise.	Dealscan, Orbis, Osiris
WW	*WW Index* is constructed following Whited and Wu (2006) in Farre-Mensa and Ljungqvist (2016) as −0.091 [(*ib* + *dp*)/*at*] − 0.062 [indicator set to one if *dvc* + *dvp* is positive, and zero otherwise] + 0.021 [*dltt*/*at*] − 0.044 [log(*at*)] + 0.102 [average industry sales growth, estimated separately for each three-digit SIC industry and each year, with sales growth defined as above] − 0.035 [sales growth], where all variables in italics are Compustat data items.	Compustat
No dividend	Dummy variable, equals 1 for firms with a history of zero dividends on common stock (Compustat item *dvc*), going as far back as 1970 (Farre-Mensa and Ljungqvist 2016).	Compustat
Small firms	Dummy variable, equals 1 for small firms whose total assets are below the sample median of each country per year (Bharath et al. 2011).	Compustat
Infrastructure	Dummy variable, equals 1 for borrowers in transportation, communications, electric, gas, and sanitation services.	Dealscan
PCF	Dummy variable equal to 1 for politically connected firms with at least one politically connected director.	NRG Metrics
Rated firm dummy	Dummy variable equal to 1 if the firm has a credit rating at loan origination.	SDC, Compustat
Borrower country variables		
GDPpc	Logarithm of real GDP per capita.	WDI
Sovereign rating	Moody's sovereign rating, which takes the value of 17 if the country has AAA rating, and the value decreases as the rating deteriorates, with the lowest value 1 for ratings below B-.	Moody
KAOPEN	Capital account openness index, normalized between 0 and 1.	Chinn and Ito (2006)

Table A1 (*continued*)

Variable	Description	Source
Governance	Average of six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Each individual governance index ranges from −2.5 (weak) to 2.5 (strong).	WGI
Creditor rights	Creditor rights protection index, strength of legal rights index (0 = weak to 4 = strong for 1996–2004; 10 = strong for 2005–2014, 12 = strong for 2015–2016).	Djankov, McLiesh, and Shleifer (2007) and World Bank's Doing Business
Political rating	Logarithm of the ICRG's political rating. The composite scores of political rating are scaled between 0 and 100, with 100 representing the least risk.	ICRG
Banking crisis	Dummy variable equal to 1 if the country of the borrower has a systemic banking crisis.	Laeven and Valencia (2013, 2020)
Recession	Dummy variable equal to 1 if the country of the borrower has a negative growth rate of real GDP.	WDI
Global variables		
Fed funds rate	Effective federal funds rate, which is calculated as a volume-weighted median of overnight federal funds transactions reported in the FR 2420 Report of Selected Money Market Rates.	St. Louis Fed

References

Acharya, V.V., Almeida, H., Campello, M., 2013. Aggregate risk and the choice between cash and lines of credit. J. Financ. 68 (5), 2059–2116.
Arrow, K., Lind, R., 1970. Uncertainty and the evaluation of public investment decisions. Am. Econ. Rev. 60 (3), 364–378.
Avdjiev, S., Hale, G., 2019. US monetary policy and fluctuations of international bank lending. J. Int. Money Financ. 95, 251–268.
Bae, K., Goyal, V., 2009. Creditor rights, enforcement, and bank loans. J. Financ. 64, 823–860.
Beck, T., Demirgüç-Kunt, A., Maksimovic, V., 2008. Financing patterns around the world: Are small firms different? J. Financ. Econ. 89 (3), 467–487.
Becker, B., Ivashina, V., 2014. Cyclicality of credit supply: Firm level evidence. J. Monetary Econ. 62: 76-93.
Bekaert, G., Harvey, C.R., Lundblad, C.T., Siegel, S., 2014. Political risk spreads. J. Int. Business Stud. 45(4): 471-493.
Berger, A.N., Klapper, L.F., Udell, G.F., 2001. The ability of banks to lend to informationally opaque small businesses. J. Bank. Financ. 25 (12), 2127–2167.
Bernanke, B., Gertler, M., Gilchrist, S., 1996. The financial accelerator and the flight to quality. Rev. Econ. Statistics 78 (1), 1–15.
Bharath, S., Dahiya, S., Saunders, A., Srinivasan, A., 2011. Lending relationships and loan contract terms. Rev. Financ. Stud. 24 (4), 1141–1203.
Borisova, G., Fotak, V., Holland, K., Megginson, W.L., 2015. State ownership and cost of debt: Evidence from government investments in publicly traded firms. J. Financ. Econ. 118, 168–191.
Bradley, M., Roberts, M.R., 2015. The structure and pricing of corporate debt covenants. Quarterly J. Financ. 5 (02), 1–37.
Bräuning, F., Ivashina, d V., 2020. U.S. monetary policy and emerging market credit cycles. J. Monetary Econ. 112: 57-76.
Brei, M., Schclarek, A., 2013. Public bank lending in times of crisis. J. Financ. Stab. 9 (4), 820–830.
Brei, M., Schclarek, A., 2015. A theoretical model of bank lending: Does ownership matter in times of crises? J. Bank. Financ. 50, 298–307.
Brei, M., Schclarek, A., 2018. The countercyclical behavior of national development banks in Latin America and the Caribbean. In: Griffin-Jones, S., Ocampo, J. A. (Eds.), The Future of National Development Banks. Oxford University Press.
Broccolini, C., Lotti, G., Maffioli, A., Presbitero, A.F., Stucchi, R., 2021. Mobilization effects of multilateral development banks. World Bank Econ. Rev. 35 (2), 521–543.
Brunnermeier, M.K., Oehmke, M., 2013. The maturity rat race. J. Financ. 68 (2), 483–521.
Cameron, R.E., 1953. The crédit mobilier and the economic development of Europe. J. Political Econ. 61 (6), 461–488.
Carey, M., Nini, G., 2007. Is the corporate loan market globally integrated? A pricing puzzle. J. Financ. 62 (6), 2969–3007.
CDB, 2013. Annual Report.
CDB, 2019. Annual Report.
Chava, S., Roberts, M., 2008. How does financing impact investment? The role of debt covenants. J. Financ. 63, 2085–2121.
Chinn, M., Ito, H., 2006. What matters for financial development? Capital controls, institutions, and interactions. J. Dev. Econ. 81 (1), 163–192.
de Aghion, B.A., 1999. Development banking. J. Dev. Econ. 58, 83–100.
De Haas, R., Van Horen, N., 2013. Running for the exit? International bank lending during a financial crisis. Rev. Financ. Stud. 26 (1), 244–285.
Degl'Innocenti, M., Frigerio, M., Zhou, S., 2022. Development banks and the syndicate structure: Evidence from a world sample. J. Empirical Financ. 66: 99-120.
Delis, M.D., Hasan, I., Ongena, S., 2020. Democracy and credit. J. Financ. Econ. 136 (2), 571–596.
Demirgüç-Kunt, A., Huizinga, H., 2013. Are banks too big to fail or too big to save? International evidence from equity prices and CDS spreads. J. Bank. Financ. 37 (3), 875–894.
Diamond, W., 1957. Development Banks. The John Hopkins University Press, Baltimore and London.
Diamond, D.W., 1984. Financial intermediation and delegated monitoring. Rev. Econ. Stud. 51 (3), 393–414.
DiGiovanni, J., Kalemli-Ozcan, S., Ulu, M.F., Baskaya, Y.S., 2022. International spillovers and local credit cycles. Rev. Econ. Stud. 89 (2), 733–773.
Dinc, I.S., 2005. Politicians and banks: Political influences on government-owned banks in emerging markets. J. Financ. Econ. 77 (2), 453–479.
Djankov, S., McLiesh, C., Shleifer, A., 2007. Private credit in 129 countries. J. Financ. Econ. 84 (2), 299–329.
EBRD, 2020. Economic performance of state-owned enterprises in emerging economies—A cross-country study.
Eslava, M., Freixas, X., 2021. Public development banks and credit market imperfections. J. Money, Credit and Banking 53 (5), 1121–1149.
Faccio, M., 2006. Politically connected firms. Am. Econ. Rev. 96, 369–386.
Farre-Mensa, J., Ljungqvist, A., 2016. Do measures of financial constraints measure financial constraints? Rev. Financ. Stud. 29 (2), 271–308.
Fazari, S., Hubbard, G., Petersen, B., 1988. Financing constraints and corporate investment. Brookings Papers on Econ. Activity 19, 141–195.
Fernández-Arias, E., Hausmann, R., Panizza, U., 2020. Smart development bank. J. Ind., Competition and Trade 20, 395–420.
Forbes, K.J., Warnock, F.E., 2012. Capital flow waves: Surges, stops, flight, and retrenchment. J. Int. Econ. 88 (2), 235–251.
Fotak, V., Lee, H., Megginson, W., 2019. A BIT of Investor Protection: How Bilateral Investment Treaties impact the terms of syndicated loans. J. Bank. Financ. 102, 138–155.
Fotak, V., Lee, H., 2020. Public-private co-lending: Evidence from syndicated corporate loans. J. Bank. Financ. 119, 105–898.
Fratzscher, M., 2012. Capital flows, push versus pull factors and the global financial crisis. J. Int. Econ. 88 (2), 341–356.
Frigerio, M., Vandone, D., 2020. European development banks and the political cycle. Eur. J. Polit. Econ. 62, 101852.
Galindo, A.J., Panizza, U., 2018. The cyclicality of international public sector borrowing in developing countries: Does the lender matter? World Dev. 112, 119–135.

Giannetti, M., Laeven, L., 2012a. The flight home effect: Evidence from the syndicated loan market during financial crises. J. Financ. Econ. 104, 23–43.
Giannetti, M., Laeven, L., 2012b. Flight home, flight abroad, and international credit cycles. Am. Econ. Rev. 102 (3), 219–224.
Gong, D., Jiang, T., Wu, W., 2018. A foreign currency effect in the syndicated loan market of emerging economies. J. Int. Financ. Markets, Inst. Money 52, 211–226.
Griffith-Jones, S., Ocampo, J., 2018. The Future of National Development Banks. Initiative for Policy Dialogue. Oxford University Press
Gurara, D., Presbitero, A., Sarmiento, M., 2020. Borrowing costs and the role of multilateral development banks: evidence from cross-border syndicated bank lending. J. Int. Money and Financ. 100, 102090.
Hadlock, C.J., Pierce, J.R., 2010. New evidence on measuring financial constraints: Moving beyond the KZ index. Rev. Financ. Stud. 23 (5), 1909–1940.
Hainz, C., Kleimeier, S., 2012. Political risk, project finance, and the participation of development banks in syndicated lending. J. Financ. Intermediation 21 (2), 287–314.
Holmstrom, B., Tirole, J., 1997. Financial intermediation, loanable funds, and the real sector. Q. J. Econ. 112 (3), 663–691.
Houston, J., Jiang, L., Lin, C., Ma, Y., 2014. Political connections and the cost of bank loans. J. Account. Res. 52 (1), 193–243.
Hu, B., Schclarek, A., Xu, J., Yan, J., 2022. Long-term finance provision: National development banks VS. commercial banks. World Dev. 158, 105973. https://doi.org/10.1016/j.worlddev.2022.105973.
Ivashina, V., 2009. Asymmetric information effects on loan spreads. J. Financ. Econ. 92 (2), 300–319.
Ivashina, V., Scharfstein, D., 2010. Loan syndication and credit cycles. Am. Econ. Rev. 100 (2), 57–61.
James, C., Kizilaslan, A., 2014. Asset specificity, industry-driven recovery risk, and loan pricing. J. Financ. Quantitative Anal. 49 (3), 599–631.
Kaplan, S.N., Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? Q. J. Econ. 112 (1), 169–215.
Kirschenmann, K., 2016. Credit rationing in small firm-bank relationships. J. Financ. Intermediation 26, 68–99.
Laeven, L., Valencia, F., 2013. Systemic banking crises database. IMF Econ. Rev. 61 (2), 225–270.
Laeven, L., Valencia, F., 2020. Systemic banking crises database II. IMF Econ. Rev. 68 (2), 307–361.
Lang, W.W., Nakamura, L.I., 1995. 'Flight to quality' in banking and economic activity. J. Monetary Econ. 36 (1), 145–164.
Layne, D., 2016. History of the Business Development Bank of Canada: The FBDB Period (1975–1995). The Business Development Bank of Canada, Montreal, Canada.
Lazzarini, S.G., Musacchio, A., Bandeira-de-Mello, R., Marcon, R., 2015. What Do State-Owned Development Banks Do? Evidence from BNDES, 2002–09. World Dev. 66, 237–253.
Lim, J., Minton, B., Weisbach, M., 2014. Syndicated loan spreads and the composition of the syndicate. J. Financ. Econ. 111, 45–69.
Lin, C., Ma, Y., Malatesta, P., Xuan, Y., 2011. Ownership structure and the cost of corporate borrowing. J. Financ. Econ. 100 (1), 1–23.
Lin, C., Ma, Y., Malatesta, P., Xuan, Y., 2012. Corporate ownership structure and bank loan syndicate structure. J. Financ. Econ. 104, 1–22.
Maddala, G.S., 1983. Limited-dependent and qualitative variables in econometrics. Cambridge University Press, New York.
Martin, A., Skeie, D., von Thadden, E., 2014. The fragility of short-term secured funding markets. J. Econ. Theory 149, 15–42.
Milde, H., Riley, J.G., 1988. Signaling in credit markets. Q. J. Econ. 103 (1), 101–129.
Morgan, D.P., 2002. Rating banks: Risk and uncertainty in an opaque industry. Am. Econ. Rev. 92 (4), 874–888.
Nandy, D., Shao, P., 2010. Institutional investment in syndicated loans. UBC Winter Finance Conference 2008 Paper, EFA 2009 Bergen Meetings Paper. SSRN: https://ssrn.com/abstract=966276.
Ongena, S., Tümer-Alkan, G., Von Westernhagen, N., 2018. Do exposures to sagging real estate, subprime, or conduits abroad lead to contraction and flight to quality in bank lending at home? Rev. Financ. 22 (4), 1335–1373.
Qian, J., Strahan, P.E., 2007. How laws and institutions shape financial contracts: The case of bank loans. J. Financ. 62 (6), 2803–2834.
Renneboog, L., Szilagyi, P.G., Vansteenkiste, C., 2017. Creditor rights, claims enforcement, and bond performance in mergers and acquisitions. J. Int. Business Stud. 48 (2), 174–194.
Ru, H., 2018. Government credit, a double-edged sword: Evidence from the China Development Bank. J. Financ. 73 (1), 275–316.
Safavian, M., Sharma, S., 2007. When do creditor rights work? J. Comparative Econ. 35, 484–508.
Santos, J.A., 2011. Bank corporate loan pricing following the subprime crisis. Rev. Financ. Stud. 24 (6), 1916–1943.
Santos, J.A., Winton, A., 2008. Bank loans, bonds, and information monopolies across the business cycle. J. Financ. 63 (3), 1315–1359.
Sapienza, P., 2004. The effects of government ownership on bank lending. J. Financ. Econ. 72 (2), 357–384.
Sarmiento, M., 2022. Sudden yield reversals and financial intermediation in emerging markets. J. Financ. Stability (in Press), https://www.sciencedirect.com/science/article/abs/pii/S1572308922000729.
Schclarek, A., Xu, J., Yan, J., 2022. The maturity lengthening role of national development banks. Int. Rev. Financ., 1–28. https://doi.org/10.1111/irfi.12391.
Schclarek, A., Xu, J., 2022. Exchange rate and balance of payment crisis risks in the global development finance architecture. J. Int. Financ. Markets, Inst. & Money 79, 101574. https://doi.org/10.1016/j.intfin.2022.101574.
Sharpe, S.A., 1990. Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships. J. Financ. 45 (4), 1069–1087.
Shleifer, A., Vishny, R.W., 1994. Politicians and firms. Quart. J. Econ. 109, 995–1025.
Standard & Poor's, 2014. A syndicated loan primer. Standard & Poor's, New York.
Stiglitz, J.E., Weiss, A., 1981. Credit rationing in markets with imperfect information. Am. Econ. Rev. 71, 393–410.
Sufi, A., 2007. Information asymmetry and financing arrangements: Evidence from syndicated loans. J. Financ. 62 (2), 629–668.
Sufi, A., 2009. Bank lines of credit in corporate finance: An empirical analysis. Rev. Financ. Stud. 22 (3), 1057–1088.
Whited, T., Wu, G., 2006. Financial constraints risk. Rev. Financ. Stud. 19, 531–559.
World Bank, 2015. Long-term finance. World Bank: Global Financial Development Report 2015/2016.
Xu, J., Ren, X., Wu, X., 2019. Mapping development finance institutions worldwide: Definitions, rationales, and varieties. NSE Development Financing Research Report No. 1, Institute of New Structural Economics, Beijing, China.
Xu, J., Marodon, R., Ru, X., Ren, X., Wu, X., 2021a. What are public development banks and development financing institutions?——Qualification criteria, stylized facts and development trends. China Econ. Quarterly Int. 1 (4), 271–294.
Xu, J., Wang, K., Ru, X., 2021b. Funding sources of national development banks. New Struct. Econ. Dev. Financ. Res. Report No. 3.