

The Future of National Development Banks

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I. Introduction

This paper presents the framework for Columbia University's Initiative for Policy Dialogue (IPD) research project on national development banks, which has been supported by the Brazil's National Economic and Social Development Bank (BNDES) and the Development Bank of Latin America (CAF). The project focuses on development banks, including public sector banks active in project financing for development purposes (for example in infrastructure), but excludes public sector commercial banks.

The main activity of most development banks is second-tier lending –i.e., partial or full rediscounting of loans provided by other financial intermediaries, particularly commercial or investment banks. However, as is indicated below and is detailed in the case studies for this project, many also do first-tier lending, and clearly so do the banks active in project financing. Several are also involved –and, in fact, increasingly so— in guaranteeing private sector operations rather than lending, and those active in inclusive finance or agricultural lending also run guarantee funds. Equity investments are less common today than in the past, but at least one type of such investments, in equity or debt funds active in sectors of priority of the different banks, has become a growing activity of some of these banks in recent years.

In the wake of the 2007/09 North-Atlantic financial crisis, there has been renewed support for these institutions, as the limitations and problems of a purely private financial sector have become more evident to different strands of economic thinking. It became obvious after 2007/09 that the private financial system on its own cannot perform well to support the real economy. It has been pro-cyclical, over-lending in boom times but rationing credit during and after crises. In both tranquil, but more in turbulent times, it has also not funded sufficiently long-term investment in innovation and skills, which businesses need to grow and create jobs. Key sectors, like infrastructure, renewable energy and energy efficiency, have been insufficiently funded. And small and medium enterprises, as well as poor households, get insufficient credit, which is often costly and short-term. The implication of this is that “irrespective of policy orientation, the failure of private financial markets to deliver adequate long-term finance forces governments to rely on development banking institutions” (Chadrsekhar, 2016, p. 24).

The depth of concern about the financial sector is illustrated by IMF Managing Director, Christine Lagarde, stating: “*We need a financial system that serves society.*” (Lagarde, 2015).

At the same time, as concerns about the limitations of a purely private financial system grew, the positive role that many development banks played during the crisis and its aftermath, especially but not only by providing counter-cyclical finance, have been increasingly accepted, both in emerging and developing countries –where development banks have played a key role in countries like Brazil, China and India, to mention only a few cases—but also increasingly in developed economies. The latter is

evidenced by the recent creation of development banks in countries like France and Ireland and the positive evaluation of long-established successful development banks, like KfW, which is widely seen as having played a positive role in the growth and structural transformation (e.g., to a greener economy) in the most successful European economy, Germany.

The recent creation of two large multilateral development banks, the Asia Infrastructure Investment Bank (AIIB) - that 57 countries, including all major European countries and important emerging economies like Brazil initially joined as members, followed by many more countries joining later - and the BRICS's New Development Bank (NDB), also seems to reflect the shift in the development finance paradigm towards a more balanced public-private mix for provision of long-term funding.

More broadly, development banks play at least five crucial roles in the development process: (i) counteracting the pro-cyclical behavior of private financing; (ii) promoting innovation and structural transformation, which are inherent to dynamic economic growth; (iii) enhancing financial inclusion; (iv) supporting the financing of infrastructure investment, which is also crucial for economic growth; and (v) supporting the provision of public goods, and particularly combatting climate change and, more broadly, promoting environmental sustainability and “green growth”. In several countries, development banks are also active in rural and export financing, as well as in investment of risk capital in specific firms or projects associated with their development mandates.

It is interesting that institutions like the World Bank, which in the past were quite critical of national development banks, drawing on papers such as that by La Porta, Lopez-de-Silanes, and Shleifer (2002), have increasingly become supportive of these institutions, especially since the 2007/09 crisis. Thus, drawing on a global survey of national development banks carried out by the World Bank, Luna Martinez and Vicente (2012), conclude that “DBs with clearly defined mandates, high corporate governance standards, strong risk management capability, proper regulation and supervision, and a strong management team have been successful.” (Luna Martinez and Vicente 2012, p. 24).

Along similar lines, the London School of Economics’ Growth Commission concluded that for the UK: “An Infrastructure Bank (IB) to facilitate the provision of stable, long-term, predictable, mostly private sector finance for infrastructure is desirable. There are good theoretical reasons for the creation of such a bank... There are good practical examples that show the advantages of a bank with this sort of mandate, such as Brazil’s BNDES, Germany’s KfW, the European Bank for Reconstruction and Development and to some extent the European Investment Bank.” (Aghion et al 2013, p.25).

Furthermore, the Addis Ababa Action Agenda, approved by all United Nations members after the 2015 Financing for Development Conference, expressed very strong support for development banks. The Agenda stated, in particular, that: “National development banks...can play a vital role in providing access to financial services. We encourage both international and domestic development banks to promote finance for micro, small and medium-sized enterprises” (AAAA, 2015,

p.21). It expressed similar support for using national development banks, in collaboration with private financial institutions and investors, to help fund infrastructure and, more broadly, achieve the sustainable development goals.

An important point not frequently made in the literature is that, for emerging and developed economies in particular, a more diversified financial structure than one that is focused mainly on private (often large) banks, may have several advantages, including for competition and financial stability. Firstly, it may encourage competition between different types of financial institutions, which could lead to reducing the interest rates they charge. Secondly, a more diversified financial system, *especially* if not having inter-connected risks, could result in less systemic risk and therefore contribute to financial stability. Thirdly, if different varieties of financial institutions have different strengths, having a more diverse system could make it more likely that the financial sector fulfills the functions needed for inclusive growth.¹

Many development banks, though having paid-in capital provided by governments, raise their funds on the national and sometimes international private capital markets. Typically, their loans are also co-financed by private agents, helping prolong the maturities that private finance provides. Leveraging public resources with private ones has been especially valued in contexts of limited fiscal space, like in the European Union in the wake of the Eurozone debt crisis. This has led to important increases in the capital of some banks (e.g., KfW) and to the expansion of the capital

¹ To include some stylized facts, development banks are good at counter-cyclical lending and at providing long-term finance for private investment in infrastructure; private banks are good at providing international trade credit as well as financing the needs of large domestic and foreign companies; and low end institutions are good at giving credit to MSMEs, especially in specific localities.

of the European Investment Bank (EIB), as well as to the launch of the Juncker Plan, with the EIB at its center, but with a major role for the private sector.

It is important to underscore that what should be promoted are “good” development banks. To have “good” development banks implies having institutions that have clear mandates and are well governed and well run, so they can fulfill their functions well. Their main objective is to maximize their development impact rather than profits, though assuring at least minimal commercial returns. Their creation and consolidation can thus be understood as part of the effort to build strong state capacities. Indeed, when they fulfill these objectives, they can play a central role in implementing crucial government policies, such as industrial policy, infrastructure investment and social inclusion. A key challenge is how best to achieve these goals in different categories of countries, which is one of the central themes of this project. Furthermore, “good” national development banks need to collaborate effectively, both with private financial institutions and investors, as well as with regional and multilateral development banks.

In what follows (section II), we briefly outline key analytical and theoretical analysis underpinning the need for development banks. In section III, we use mainly existing studies to outline key features of national development banks. We will then discuss the main roles that national development banks do and should play in section IV. We draw this analysis from the thematic papers and key questions for the case studies of the project.

II. Brief review of analytical and theoretical literature

Despite their size and importance, little research has been done on the analytical rationale for national development banks.

In the three decades after World War II, the financial sector functioned quite well in developing and developed countries. National development banks performed, and were broadly seen to play valuable roles. However, policy concerns that the so-called “financially repressed” systems were inefficient started to emerge. This was the basic argument that encouraged financial liberalization (Gurley and Shaw, 1955; McKinnon, 1973). In the framework of this efficient financial market school, the existence of public financial institutions, such as development banks, was –almost by definition— seen as negative. As a consequence, development banks were criticized –fairly and unfairly— and their role was reduced sharply in many countries. Some were liquidated.

An alternative theoretical framework that arose as the financial liberalization process was gaining traction emphasized credit rationing, which describes a situation in which, even when agents are willing to pay a higher interest rate to get the funds to finance their investments, private banks may refuse financing. In contrast with the previous school, this framework justifies the existence of development banks, which would supply the necessary credit to investment, unavailable in the private financing system. This approach is associated with the theory of market failures in financial markets (Stiglitz and Weiss, 1981; Stiglitz, 1989). Credit rationing occurs due to a

malfunction of the financial markets, caused by imperfect information and information asymmetries that prevent financial markets from functioning efficiently.

Furthermore, in this context, adverse selection and moral hazard accentuate these market imperfections.

Stiglitz (1994) argues that market failures in financial markets are likely to be endemic as those markets are particularly information intensive, thus making information imperfections and asymmetries as well as incomplete contracts more important and disruptive than in other sectors. Therefore, in this context, market failures tend to be greater than government failures. The benefits of government interventions tend, therefore, to outweigh their costs. This provides a first robust case for a “visible hand of government,” both through effective public development banks and through robust regulation of private financial markets.

Stiglitz and Greenwald (2014) further argue that knowledge and information markets also have huge market imperfections, and that they are basically public goods. As a consequence, governments have a clear role in promoting a learning society, to help achieve increases in productivity. Development banks are an institutional vehicle to help achieve this objective. Besides providing long-term finance, they can provide specific incentives for innovation. Furthermore, because of their long-term perspective, they can help fund, accumulate and coordinate expertise in specific areas of innovation. Naturally in this task they need to, and do, collaborate with other actors, both public and private.

From a complementary theoretical perspective, several commentators (e.g. Wray, 2009) argue there is a preference for liquidity amongst investors, as well as banks, which is responsible for the limitations of the supply of credit for investment. Given the uncertainty about the future, depending on the characteristics of the new sectors/projects that require resources, banks often offer no or insufficient credit (especially long-term credit) even if the financial system is fully developed.

Therefore, the existence of development banks is justified by the existence of key sectors and investment projects for structural transformation in different phases of development, which face high uncertainty as to their future success (Mazzucato, 2013). For this reason, they may not be funded by the private financial system, which prefers sectors or investment projects whose expected returns are less uncertain. These are often highly complex and expensive sectors/projects, which require sophisticated expertise in their evaluation, taking account of positive impacts across the economy (positive social externalities, for example in terms of helping mitigate climate change via lower carbon emissions). For this reason, Kregel (2015) has argued that historically it has been public banks that have led the way in financing the long-term investment necessary for the economic industrialization and transformation; furthermore, he argues that “the recent dominance of private financial institutions and the presumption of their efficiency advantage have reduced the availability of long-term finance for development.” (Kregel, 2015, p.1)

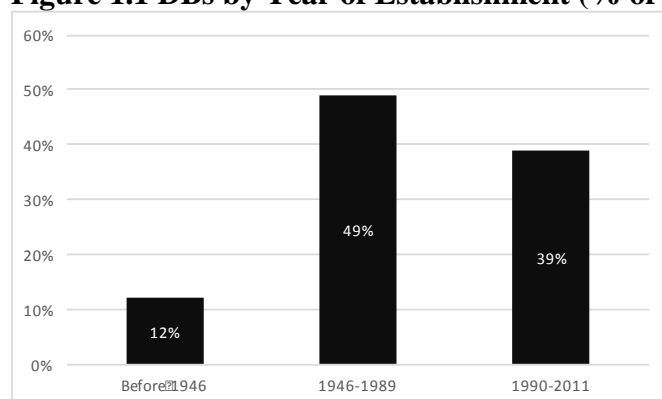
Furthermore, a key market imperfection in the operation of financial markets, basically across the board, is the tendency to “boom-bust”, with a feast of finance followed by famine (Keynes, 1936; Minsky, 1977; and Kindleberger, 1978). The pro-

cyclical nature of private finance implies the need for public development banks to provide both short-term, and especially long-term, counter-cyclical finance, as discussed below. Moreover, the 2007/8 financial crisis has shown that there is no guarantee that even developed financial markets promote the capital development of the economy during both non-crisis and crisis periods (Luna-Martinez and Vicente, 2012; Wray 2010).

III. Key features of national development banks

Several national development banks were created before the end of WWII. However, as Chandrasekhar (2016) points out, most were established in different periods after WWII: “although almost half of national development banks (49 per cent) were established... between 1946 and 1989, nearly two-fifths (39 per cent) came into existence ... between 1990 and 2011” (see also Figure 1.1, for distribution through time, including pre-WWII period).

Figure 1.1 DBs by Year of Establishment (% of DBs)



Source: Luna Martinez Vicente (2012), p.6

One first important feature that national development banks share is their large scale. According to Studart and Gallagher (2016), as well as Gallagher and Sklar (2016), the

level of total assets of national development banks is very large, reaching approximately US\$5 trillion in 2015, which is, for example, far larger than the level of loans of the multilateral development banks, which reached around \$1 trillion in the same year. It should be mentioned that other estimates for national development banks' assets are somewhat smaller, though in the same order of magnitude.

Besides their large scale, a second important feature seems to be their large number. According to Chandrasekhar (2016), drawing on a 1998 study by Nicholas Bruck, there were 550 development banks worldwide, of which around 520 were national development banks (NDBs). These were located in 185 countries, with developing countries in particular hosting an average of three or more NDBs. Latin America and the Caribbean had the largest number of NDBs (152), followed by Africa (147), Asia and the Pacific (121), Europe (49) and West Asia (47).

The task of analyzing and evaluating comparatively different NDBs is rather complex, as they differ, according to the following characteristics, as identified in the World Bank study by Luna-Martinez and Vicente (2012)

- a)* Ownership structure (fully vs. partially owned by government)
- b)* Mandate, targeted sectors and clients (narrow vs. wide focus)
- c)* Different business (lending) models to carry out their lending operations (first-tier vs. second-tier)
- d)* Credit conditions (subsidized vs. market interest rates)
- e)* Regulation and supervision (special regime vs regime applicable to all banks)

- f) Corporate governance (independent vs. government-controlled boards)
- g) Size (absolute and relative)
- h) Loan portfolio and performance indicators.

Below we summarize what existing studies say about the main characteristics of NDBs listed above. This is complemented with an analysis of key variables of these vs. other financial institutions, such as proportion of loans going to productive lending to corporates by development banks in Latin America and the Caribbean, based on original empirical analysis made by two of the co-authors of this paper, Michael Brei and Alfredo Schclarek, which is detailed in their own contribution to the project.

III. A. Main features of national development banks according to existing studies

Typically, NDBs “are institutions owned, administered, and controlled by the government (state), which provides the strategic direction of the DB and appoints their senior management and board members.” (Luna-Martinez and Vicente, 2012). Almost three quarters of NDBs surveyed by the World Bank are 100% State owned, 21% are have between 50 and 90% of State ownership, and in only 5% governments have a minority ownership.

According to Luna-Martinez and Vicente (2012, pp. 11-12), “53% of NDBs are “institutions with a narrow and specific mandate, which explicitly refers to the sector(s), type of customers or activities that a NDB is expected to support...[while] 47% of NDBs are institutions with broader legal mandates and are expected to support a broader range of activities and sectors”.

The advantages and disadvantages of a broad vs. narrow mandate is, of course, a central policy issue. Narrow mandates encourage institutions to specialize in their target market. Monitoring and performance evaluation is, therefore, easier for these institutions. In contrast, NDBs with broad mandates require resources to finance a wide range of activities and sectors. This may be valuable as the challenges and needs of the broader economy change, and thus the emphasis required from NDBs.

A good example of the advantages of a broader mandate is the emergence of climate change mitigation and adaptation as a major challenge for governments, and therefore the new priority given for NDBs to play a key role. The strategic role that NDBs play in this new and much needed frontier of investments is clear: out of total financing, approximately 35% or US\$123 billion of investments were financed by development finance institutions, of which about 60% were funded by National Development Banks (based on estimates provided in Mazzucato and Penna, 2016, drawing on data from the Climate Policy Initiative (2013)).

Economic sectors targeted by NDBs vary: “86% of NDBs targeted the trade and services sectors, 84% industry and manufacturing, 83% agriculture, 74% construction and housing, 66% energy, and 65% infrastructure. On the other hand, only 48% of the NDBs targeted the health sector, 45% education, and 43% mining” (Luna-Martinez and Vicente, 2012). There is therefore a smaller emphasis on lending to social sectors. In turn, “92% of DBs responded that they target small and medium enterprises, 60% large private corporations, 55% individuals and households, 54% other state-owned enterprises (SOEs) and 46% private financial intermediaries” (Luna-Martinez and Vicente, 2012, p.13).

In a more detailed analysis of some of the largest NDBs (CDB, KfW, BNDES and JFC), three of which are being studied in this project, Ferraz et al (2016) show that all these large banks lend to MSMEs, for innovation, for the green economy, for internationalization and for capital market development; three out of four lend to agriculture and to infrastructure.

In terms of business models, according again to Luna-Martinez and Vicente, 2012), 52% of NDBs lend through a combination of first- and second-tier operations, while only 12% of NDBs only do second-tier lending. Interestingly, a large number of “second-tier-only” NDBs are located in Latin America.

In terms of credit conditions, products offered by NDBs are mainly concentrated in “long-term loans (90%), followed by working capital loans (85%), whereas syndicated loans consisted of 52% of all DBs, and unsecured loans 25%” (Luna-Martinez and Vicente, 2012). The maturity of loans that NDBs offer is presented in table 1.1. It shows that 54% of NDB loans are over 10 years maturity. This is why it is correct to say that NDBs are a major source of so-called patient capital, especially well suited to fund projects - like in infrastructure - which become profitable only after a long period.

Table 1.1. Maximum Loan Term Offered by DBs

Maximum loan term	Percent of DBs
Up to 5 years	16%
6 to 10 years	29%
11 to 15 years	19%
16 to 20 years	22%
21 to 25 years	7%
26 to 30 years	6%
Total	100%

Source: Luna-Martinez and Vicente, (2012), p.16

Moreover, “credit at subsidized interest rates is a practice adopted by 50% of DBs covered in the survey. In this category, 66% of DBs fund these subsidies using transfers from their respective governments.” Finally, “73% of all DBs offer loan guarantee products to partially offset the losses faced by a private financial intermediary when a customer defaults” (Luna-Martinez and Vicente, 2012).

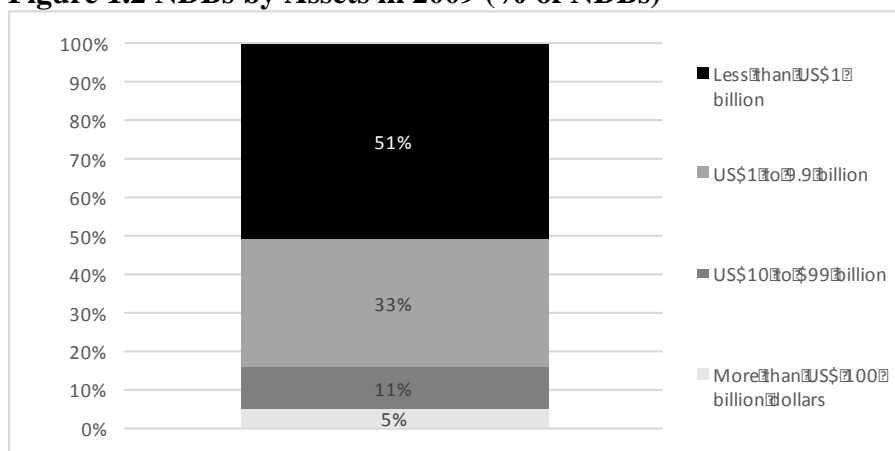
The World Bank survey shows that “76% of DBs are in fact regulated and supervised by the same institution that supervises private commercial banks in their countries, such as the central bank or the bank supervisory agency...[while] 78% of DBs indicated they are required to comply with the same standards of prudential supervision (minimum capital, minimum capital adequacy requirements, loan classification and provisioning, etc.) as private commercial banks or any other private financial institution” (Luna-Martinez and Vicente, 2012).

The fact that the regulatory agencies and principles are the same for NDBs as for other financial institutions poses some questions, which are analyzed in detail by Lavinia Barros de Castro in her contribution to this project. The major issues are the treatment of risks of long-term lending and portfolio concentration. As has been

widely recognized, existing regulation has biased commercial bank lending toward the short term. This effect must be clearly avoided in the case of NDBs. In turn, in infrastructure lending in particular, portfolio concentration is inevitable, or projects would be inadequately financed. So, regulatory norms must be revised to avoid the adverse effects they could have on the activities of NDBs.

As can be seen in Figure 1.2, there is a large range of NDBs, according to the scale of their assets. According to the World Bank survey, 5% of these banks have assets of over \$100 billion; at the other extreme, 51% of these NDBs have assets of under \$ 1 billion.

Figure 1.2 NDBs by Assets in 2009 (% of NDBs)

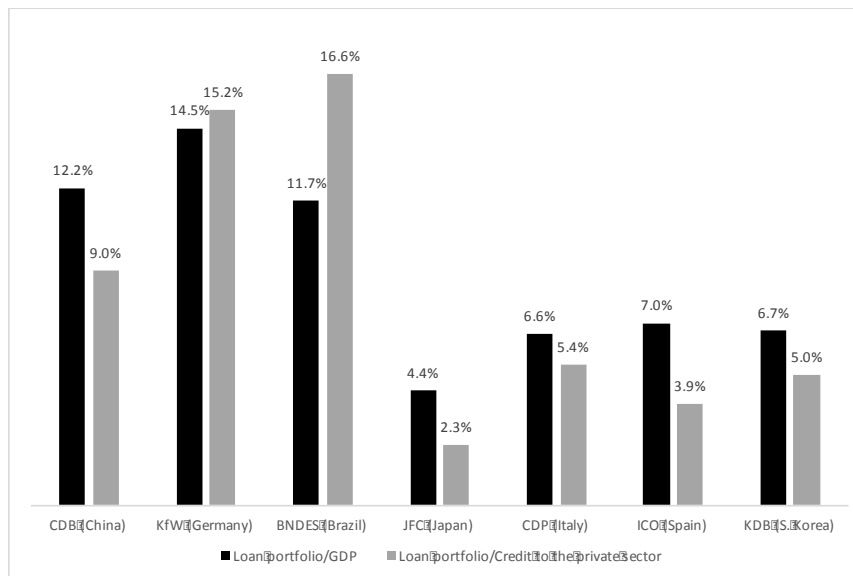


Source: Luna-Martinez and Vicente (2012), p.7

Naturally, the key variable to explore is their scale in proportion to the size of economies, as well as to the size of total credit to the private sector. Figure 1.3 shows these indicators for 2013, for some of the largest development banks. According to this data, the largest loan to GDP ratio is that of KfW, fairly closely followed by CDB and BNDES. On the other hand, if total loan portfolio is looked at as proportion of

total credit to the private sector, also for 2013, the highest ratio is for BNDES, followed by KfW and CDB. In both ratios, the other NDBs analyzed have significantly lower figures than KfW, BNDES and CDB.

Figure 1.3. DFI Loan Portfolio and Representativeness – 2013 (%)



Source: Além and Madeira (2015), p.114

Even though profit maximization is not the objective of NDBs, the World Bank survey and report shows that “In 2009, 53% of the surveyed NDBs had a Return on Assets (RoA) exceeding the average of their banking systems. This was up from 42% in 2006 and 2007, and 46% in 2008. In terms of the Return on Equity (RoE), 19% of DBs exceeded the national average in 2009, up from 15% in 2006, 13% in 2007, and 18% in 2008.” (Luna-Martinez and Vicente, 2012, p. 18). In turn, “Non-performing loan (NPL) ratios of all “second-tier-only” DBs fell within the less than 5% bracket” (Luna-Martinez and Vicente, 2012, p.17).

Looking at the some of the largest NDBs, a fairly positive picture also emerges for 2013. As Além and Madeira (2015) point out (see also Table 1.2.), delinquency rates on loans are very low, with the highest rates for Spanish ICO (that was probably worsened significantly by the Eurozone debt crisis) and for Japanese JFC. According to this information, BNDES, KfW and CDB have the lowest delinquency rates. As regards RoE, the best results according to this source are from BNDES and CDB, whilst the worst are from KDB (Korean) and JFC (Japan), both of which show actual losses.

Table 1.2. Structure and economic and financial* performance of selected DFIs-2013

	CDB	KfW	BNDES	JFC	CDP	CDC	ICO	KDB
	China	Germany	Brazil	Japan	Italy	France	Spain	S. Korea
Assets (US\$ billions)	1,331.30	719.70	63.40	60.40	42.40	190.70	136.30	131.10
Loan portfolio (US\$ billion)	1,172.30	628.80	63.50	22.80	37.60	nd	95.00	7.90
Net profit (US\$ billion)	3.00	1.17	8.60	(2.90)	8.10	2.50	0.10	(1.30)
Delinquency rate (%)	0.48	0.13	0.01	2.98	0.20	nd	5.30	5.10
Return/assets (%)	0.02	0.27	0.01	(1.13)	0.29	0.33	0.08	(1.01)
Return/equity (%)	5.07	6.21	5.34	(6.84)	4.00	nd	1.76	(8.85)
Number of employees	8,468.00	5,374.00	2,859.00	7,361.00	1,440.00	nd	310.00	n.d
Year of foundation	1994	1948	1952	2008	1850	1816	1988	1954

Source: Além and Madeira (2015), p. 110

A final important feature of NDBs is funding. According to the World Bank survey, 89% of NDBs borrow from other financial institutions or issue debt on local capital markets. This shows the close and positive symbiosis between public development banks and private financial institutions. 40% of these NDBs receive budget transfers from the government and 64% receive government guarantees.² It is interesting that 41% of NDBs reportedly take deposits from the general public.

² “It should be noted that receiving direct transfers from the government does not necessarily mean dependence on government funds. Sometimes, DBs - such as KfW in Germany - receive transfers from

III.B. Lending and funding structure of national development banks, from a comparative perspective.

This subsection investigates the lending and funding structure of national development banks and compares it with that of commercial public and private banks. In addition, it explores the lending and funding rates with which these banks operated. Finally, it examines the lending quality of these banks with a focus on non-performing loans. The data used covers 422 banking institutions (27 national development banks, 36 public banks and 359 private banks) from 35 jurisdictions in Latin America and the Caribbean over the period 2000-14. All values are unweighted averages across banks and countries.³ A detailed discussion of the underlying data is provided in another chapter in this book, written by Brei and Schclarek (2017).

The lending activity of national development banks differs remarkably from that of private banks. As can be seen in Figure 1.4(a), development banks have focused their activities on lending, as evidenced by an average loan-to-asset ratio of 58.6% over the period 2000-14 (with the rest being composed of assets like securities and liquid assets).⁴ This pattern is to some extent similar to commercial public banks, which have invested 52.6% of their assets in customer loans. However, these ratios stand in contrast to those of private banks in the region, which recorded a far lower average

the government to fund interest rate subsidies to a particular type of borrower. (Luna-Martinez and Vicente, 2012, p.10-11).

³ Our results do not change significantly if we weight for the size of banks.

⁴ Total loans includes residential mortgage loans, other mortgage loans, other consumer/ retail loans, corporate and commercial loans, other loans and reserve against possible losses on impaired or non-performing loans.

loan-to-asset ratio of 43.7%.⁵ Interestingly, the lending activity of national development banks has been focused mainly on the provision of productive lending in the form of corporate and commercial loans (see Figure 1.4(b)).⁶ To be more precise, an average of 49.3% of assets have been devoted to the productive lending activity, compared to 31.2 and 20.1% in the case of public and private banks, respectively. Clearly, national development banks are an important source of productive funding for corporations, reaffirming their role as promoters of economic development.

Over the considered period, public banks have had the highest ratios of holdings of government securities as a proportion of total assets, as can be seen in Figure 1.4(c).⁷ In the more recent period, however, it appears that national development banks have increased their share of government securities, thereby counteracting the decrease in government securities of their public bank peers. Private banks, on the other hand, have invested much less into government securities. The results might be a sign that national development banks are refocusing their lending activities towards infrastructural lending to the government, an important determinant of economic development. However, if the increased holding of government securities were due to increased financing of government current expenses, this would be problematic. Note, however, that from our data it is impossible to assess the exact reason for the holding of government securities or the use of these funds by the government. For example, it could be the case that the government is recapitalizing the bank by granting it

⁵ On average, total assets of national development banks are composed of approximately 60% loans, 20% securities (which include any bonds), 10% liquid assets, and 10% interbank positions (may include lending to the central bank). If weighted by total assets, the ratio of loans in total assets increases, which suggests that the large development banks have a heavier focus on lending than smaller development banks.

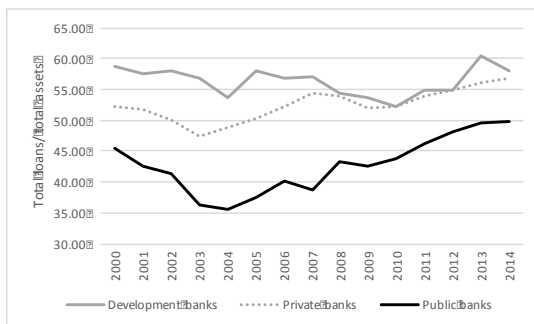
⁶ Corporate and commercial loans include loans and leases to corporate and commercial enterprises.

⁷ Government securities include all treasury bills and government securities.

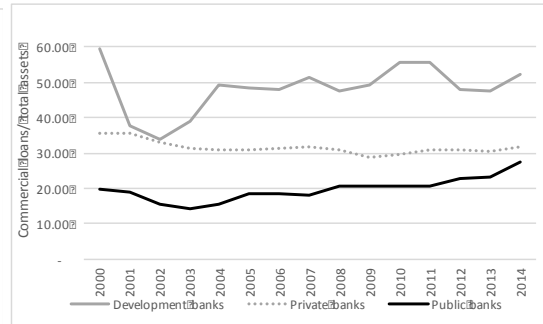
government securities. In this case, the increased holding of government securities would not be evidence that the bank is financing the government, but quite the opposite. To get a thorough answer to these questions a detailed case study of funding and lending structures should be carried out for each national development bank, which is not the objective here.

Figure 1.4. Selected indicators on bank balance sheets, 2000-2014

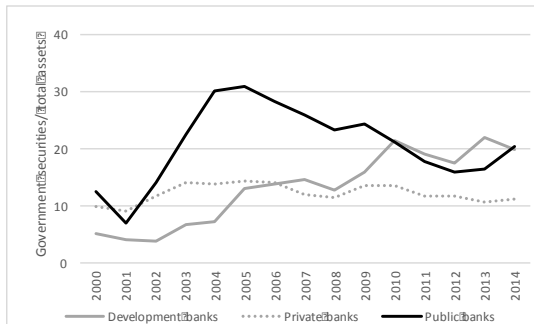
(a) Total loans



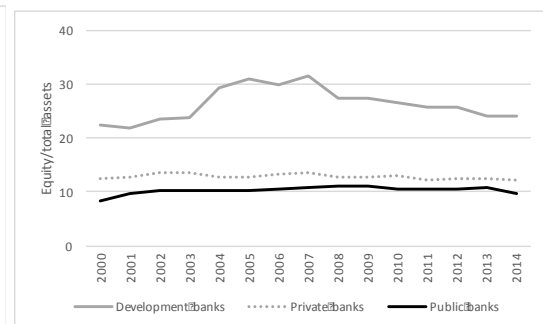
(b) Corporate and commercial loans



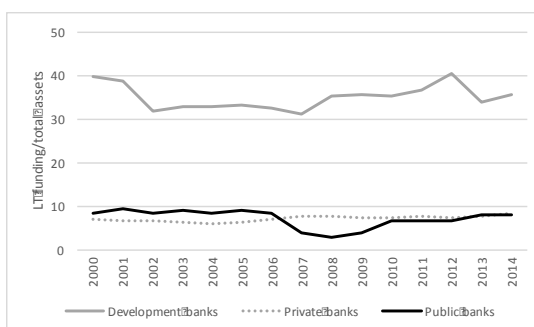
(c) Government securities



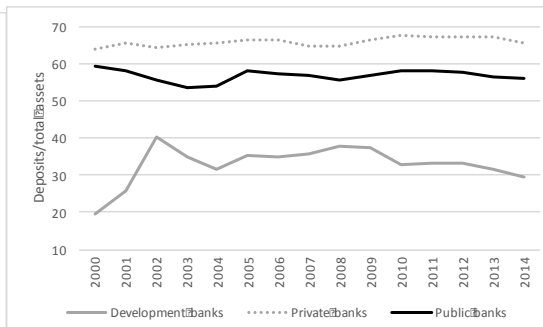
(d) Equity



(e) Long-term funding



(f) Deposits



Note: The figures are based on 422 banks (27 national development banks, 36 public banks and 359 private banks) from 35 jurisdictions in Latin America and the Caribbean. Development banks are banks that are state-owned, non-retail deposit taking, and not foreign- or multilateral-owned development banks. Public banks are majority-owned banks by a government, and private banks are the remaining banks. Government securities include treasury bills and other government securities. Long-term funding includes senior debt maturing after 1 year, subordinated borrowing and other long-term funding. All values are unweighted averages across banks and countries. Sources: BankScope, Claessens and von Horen (2015), authors' own calculations.

The funding structure of development banks is inherently different from that of public and private banks (see Figure 1.4(d)-(e)). The average figures suggest that development banks have relied on more stable sources of funding, as evidenced by significantly higher equity (bank capital) and long-term funding ratios.⁸ More specifically, while development banks recorded on average equity and long-term funding ratios of 25.8 and 35.7% of assets, respectively, these ratios have been much lower for public and private banks. Their long-term funding represented on average 7.4% of assets, while the equity-to-asset ratio averaged 12.5% in the case of private banks and 9.9% in the case of public banks. This difference can be explained by the fact that both private and public banks financed their activities mainly through deposits (see Figure 1.4 (e)), which is not the case for development banks.⁹ Evidently, the funding structure of development banks shows that they are better prepared for financing long-term projects without suffering a term mismatch.

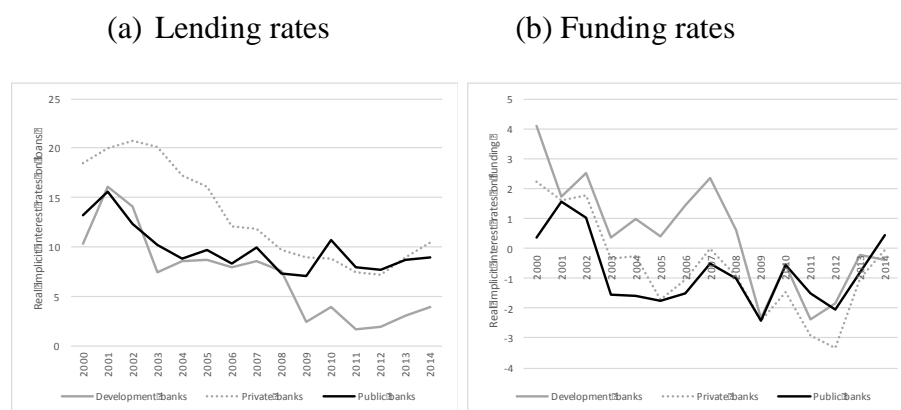
Regarding real lending rates, national development banks tend to provide their loans at lower interest rates compared to public and private banks in the region (see Figure 1.5 (a)). Across all banks, there has been a declining trend in real lending rates,

⁸ Equity includes common equity, non-controlling interest, securities revaluation reserves, foreign exchange revaluation reserves and other revaluation reserves. Long term funding includes senior debt maturing after 1 year, subordinated borrowing and other funding.

⁹ Deposits include current, savings and term deposits by customers.

presumably associated with the increased macroeconomic stability in the region and the reduction in US, European and Japanese interest rates that came about after the financial crisis. While the real lending rate of private and public banks averaged 13.2 and 9.8% over the period 2000-14, development banks have lent at an average rate of 7.1%. Here again, the evidence shows that national development banks are fulfilling their objective by providing economically more affordable loans to foster economic development. Note that charging a lower real interest rate than other banks does not mean necessarily that development banks are “subsidizing” lending rates. Although development banks may not be maximizing profits, they still often are making profits at these interest rate levels.

Figure 1.5 Real lending and funding rates, 2000-14



Note: Lending rates are calculated as interest income on loans divided by total loans, while funding rates are calculated as total interest expense divided by total liabilities net of equity. Real rates are calculated using predicted inflation, estimated from a simple autoregressive model. All values are unweighted averages across banks and countries.

Sources: BankScope, Claessens and von Horen (2015), authors' own calculations.

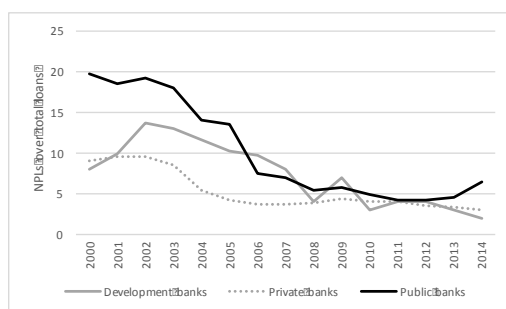
With respect to funding rates (see Figure 1.5 (b)), development banks have consistently had higher costs of external funding prior to 2008. After 2008, real funding rates across banks seem to have converged to levels below zero (after accounting for inflation) with an increasing trend in 2013-14. The lower funding costs

are presumably explained by the fact that private and public banks fund themselves mainly in the form of insured deposits, which typically pay less interest rates than long-term funding in the form of bonds and securities, which is one of the main sources of funding by development banks.

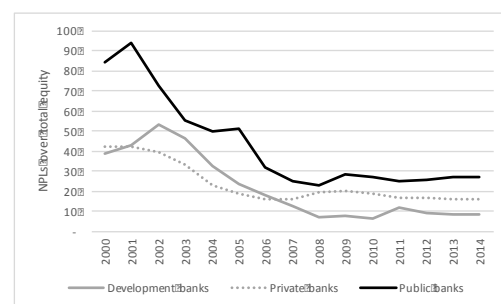
As can be seen in Figure 1.6, the riskiness of the loan portfolios across all bank types has declined significantly over the period 2000-14 for Latin American and Caribbean banks. Presumably associated with the increase in banks' risk aversion, risk management and macroeconomic stability, non-performing loans have declined to about 5% of loans since 2008. Note also that, currently, development banks have the lowest non-performance of loan ratios among all bank types, which is very positive. Development and private banks faced loan defaults and restructurings in the order of 40% of equity in 2000-2001. This pattern can be explained by the various crises that hit the region, including Argentina's and Uruguay's financial crises of 2001 and Brazil's confidence crisis of 2002. Since then, banking sector stability has increased significantly. Fostering risk management by banks and macroeconomic stability clearly reinforces the positive working of national development banks.

Figure 1.6. Lending quality, 2000-14

(a) Non-performing loans, % of loans



(b) Non-performing loans, % of equity



Sources: see Figures 1.4 and 1.5.

IV. The roles of national development banks

As indicated in the introduction to this paper, development banks play at least five crucial roles in the development process: (i) counteracting the pro-cyclical behavior of private financing; (ii) promoting innovation and structural transformation; (iii) enhancing financial inclusion; (iv) supporting infrastructure investment; and (v) supporting the provision of public goods, and particularly combatting climate change.

There are other roles that NDBs could or should play. These include helping develop and deepen financial markets, promote entrepreneurship, and promote internationalization of national firms. Indeed, some of these functions may be included in the five on which we concentrate our analysis. This is also true of other areas in which NDBs are active, particularly rural development and export growth, which will also be analyzed only in relation to the five crucial functions on which we will focus.

IV.A. Counter-cyclical lending

There is growing consensus that a first valuable function of development banks in general is their counter-cyclical role when private lending falls sharply or collapses, especially during and in the aftermath of financial crises (Griffith-Jones and Ocampo, 2008). This is particularly crucial to help maintain long-term investment, including in infrastructure, thus ensuring the continuity of existing projects and helping new ones start, valuable both for short-term growth and long-term development. It should also

help mitigate the business cycle and help prevent financial crises from deepening (Rezende 2015).

The 2007/09 North Atlantic financial crisis showed especially clearly that multilateral, regional, and national development banks of the developed and developing world significantly increased their total lending to developing countries in the years when these were most affected, through the rapid expansion of existing mechanisms, as well as via specially created ones

Indeed, the multilateral development banks (MDBs) collectively increased their lending commitments to emerging and developing economies by 72% between 2008 and 2009, the year when private capital flows to these countries fell most sharply as a result of the crisis (Griffith Jones and Gottschalk, 2012). Their disbursements also grew significantly in the same year by 40%, though at a slower rate than commitments. This represented a major counter-cyclical response, which helped sustain investment in those countries.

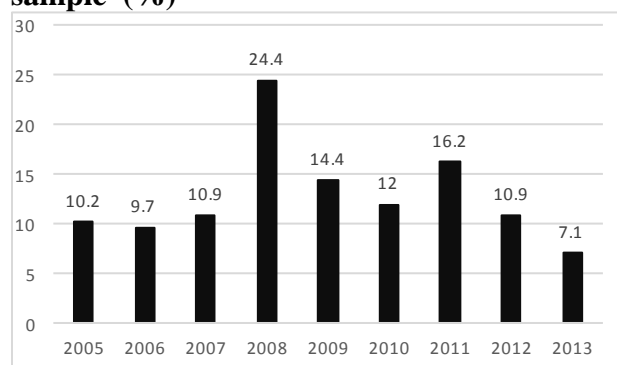
This counter-cyclical lending by multilateral and regional development banks was complemented by that of NDBs, in emerging and developed countries, as we illustrate below. Furthermore, a group of NDBs (like the Brazilian development bank BNDES and several national development banks in Asia)—also contributed to giving continuity to trade finance in cases where private trade lines fell.

Luna-Martinez and Vicente (2012) provide evidence that these banks increased their lending from US\$1.16 trillion to US\$1.58 trillion dollars between 2007 and 2009.

This increase in lending of 36% was larger than the 10% increase in private bank credit in these countries. They also find that development banks increased short and long-term lending to old and new customers who faced difficulties in refinancing their loans or receiving new lines of credit.

The clear counter-cyclical role played by the large NDBs can be seen visually in Figure 1.7, which shows that the average growth of their loan portfolio increased from around 10% in the 2005-2007 period to almost 25% in 2008, and then declined.

Figure 1.7 Average Growth of the Loan Portfolio of some DFIs from the sample*(%)



Source: Além and Madeira (2015), p. 112

There is also a small but growing body of detailed empirical evidence that national public banks provide counter-cyclical finance. Brei and Schclarek (2013 and 2015) compare the lending responses to financial crises across national public and private banks, using balance sheet information for about 560 major banks from 52 countries during the period 1994 to 2009. They find evidence that the growth rate of lending during normal times is higher for the average private bank compared to the average public sector bank. During financial crises, however, private banks' growth rate of lending decreases while that of public banks increases. These results indicate that

public banks have played a counter-cyclical role in their banking systems, while private banks behaved pro-cyclically.

They offer three explanations for this. First, the objective of state-owned banks, in contrast to their private peers, is not only to maximize profits given risks, but also to stabilize and promote the recovery of the economy. This is a similar argument made by Rudolph (2010), who argues that state financial institutions have less volatile risk aversion and therefore provide a more stable source of financing. Second, public banks may suffer less deposit withdrawals or avoid a bank run in a severe crisis, because of the implicit guarantee of the state; the securities issued by these institutions also have a preference in the market during crises. Finally, in crisis conditions, public sector banks may be more easily capitalized by governments than private banks, which may have difficulties raising the associated additional equity funds in the market.

In addition, Mazzucato and Penna (2016), as well as Turner (2015), argue that the pro-cyclical behaviour of private banks is further increased by the fact that these banks have become increasingly focussed over the past decades on short-term profits, meaning that they target low-risk, short-term gains through the trade of securities and other investments, being less interested in financing long-term productive and innovative projects.

Other papers reach similar conclusions. Thus, Micco and Panizza (2006) use bank-level data for 119 countries for the period 1995-2002 and find that lending by government-owned banks is less sensitive to business cycle fluctuations than that of

private banks. They find that this differential behavior is due to an explicit objective to stabilize credit. Bertay et al. (2015) find that lending by state banks varies less with the economic cycle, and it even rises during a banking crisis. The empirical analysis is based on an international sample of 1,633 banks from 111 countries for the period 1999-2010.

The findings may be important in policy terms. It seems key to have fairly large public sector development banks (as proportion of the total banking sector) so they can play a more significant role in generating counter-cyclical finance, and they can thus contribute more to economic recovery in times of crisis or slowdown. A significant scale of development banks may be also important for other reasons, which we elaborate below: helping ensure enough long-term finance for key sectors, like sustainable infrastructure and innovation, where profitability tends to be long-term, as well as supporting structural transformation to a sustainable and inclusive development path, helping channel sufficient and sufficiently low-cost credit to small and medium enterprises and others.

IV.B. Promoting innovation and structural transformation

There is a growing consensus that national development banks have to prioritize their role in fostering innovation and structural transformation in national economies (Gutierrez et al., 2011; Mazzucato and Penna, 2016; Olloqui, 2013). Moreover, all of the eight national development banks surveyed by Além and Madeira (2015) foster innovation. In terms of fostering industry or sector diversification, as an objective for national development banks, the recent literature is relatively limited, Mazzucato and

Penna (2016), as well as the authors of this paper, being amongst recent exceptions. This objective is easy to justify when considering, as Hidalgo et al. (2007) and Ocampo et al (2009) show, that fostering product and sector diversification is an important determinant of innovation and economic development. Moreover, as Schclarek and Navarrete (2016) argue, industry or sector diversification, by lowering aggregate credit risk, is also an important factor in fostering financial development.

The greater need for instruments to implement more long-term national development strategies for structural transformation and innovation, and in particular national development banks, has been increasingly recognized in general terms. This coincides with the acceptance of the value of a modern “industrial policy” (Rodrik, 2004) and the importance of an “entrepreneurial and development State” (Mazzucato, 2013), which, working closely with the private sector, helps give a dynamic push for private innovation and structural transformation. This builds on the success stories of the past, for example in East Asia, as well as more recently in China and India. Mazzucato (2013) also shows that much key innovation in the USA, the most free-market of economies, was spearheaded by public funding for innovation, though implemented by the private sector.

However, there is an important new element, which we discuss in more detail in the section on public goods. There is an urgent need for a major structural transformation in the development model, to make it compatible with the needs of the planet. This implies the urgency of major investment in green development. Renewable energy, partly financed by public development banks, is a valuable instrument for this.

In a complementary perspective, Stiglitz and Greenwald (2014) argue that successful and sustained growth requires the creation of a learning society and a knowledge economy to increase productivity. National development banks are an important institutional vehicle to support this aim. Indeed, development banks can help overcome market failures in both financial and knowledge markets simultaneously.

The role of national development banks related to innovation is particularly important for two reasons. First, technologies need significant financing for research and development (R&D), where investment is high risk due to factors such as failure of some projects in the search for successful solutions, and the lengthy project timeframes with limited interim financial returns. These factors constrain private investment in these areas. This requires special financing by the state, but NDBs could help finance the private component of that task. Second, as new technologies become increasingly operational and their implementation gathers speed and scale, financing is needed for large-scale and long-term investment. In this area, NDBs need to be involved in financing the required large-scale infrastructure (e.g., funding of green grids) that has important positive externalities. This will enable full-scale execution, for example of clean energy projects which otherwise may be less attractive to the private sector due to their scale or time length, and because social benefits may outweigh private benefits.

More broadly, in terms of the capacities that NDBs already possess and that makes them especially suited for providing financing to innovation as well as creation and development of new sectors or industries, Mazzucato and Penna (2016) make the point that:

“Because these are banking institutions, NDBs already have the capability and knowledge to access the economic feasibility of projects. Moreover, NDBs have traditionally supplied long-term funding (for capital-intensive projects, for example), and patient long-term committed capital is crucial for making new mission-oriented projects economically feasible. These institutions are also well positioned to coordinate stakeholders, as part of the development banking process is to coordinate stakeholders, to establish relationships, and to build up a network with an array of actors (from government officials to corporate actors to consumers). The fact that NDBs have a vast portfolio of funding tools (equity, loans, grants, etc.) will likely enable them to match the most appropriate tool to the project, whether it is incremental or radical (for example, equity or risk contracts for radical innovation, loans to incremental innovation projects, and grants to blue sky R&D). Finally, NDBs have traditionally executed their roles in coordination with governmental policiesand new missions could potentially build on this important node in the governmental network.”

The last point is perhaps particularly important. NDBs should not be seen in isolation. Their success also depends on the coordination among national economic policy agents to foster development and its funding. The latter would usually be provided in part by NDBs, which also play a key role in catalyzing private finance for key societal aims (Rezende, 2015). A good example of this is German KfW, which has played a key role in starting up renewable energy in Germany, by funding initially all private investment in solar energy; this was

done in the clear frame of government policies designed to encourage such private investment. The coordination of both elements led to an important success in this field (Griffith-Jones, 2016).

An important aspect to underscore here is the need for close collaboration and consultation between the government and the private sector to help design the best strategy, to define the right targets for structural transformation, and to achieve them most effectively. Amongst the issues that we will explore in more depth in the different case studies is, therefore: what is the role of development banks in public-private articulation to identify and select enterprises, sectors, chains and regions?

When evaluating which sectors and sub-sectors to foster, governments and development banks should put more emphasis on maximising development returns, not just financial returns. Development banks should also take the long-view, prioritising sectors that yield the highest development returns over the longer term. After sectors have been selected on this basis, projects within prioritised sectors need to be scrutinised for both potential development impact and their ability to generate positive financial returns (Griffith-Jones et al., 2016)

IV.C. Enhancing financial inclusion

There is much agreement about the important role that national development banks do and should play in providing access to financing for SMEs and microenterprises (including family agriculture), especially but not only long-term credit (Gutierrez et al., 2011; de Olloqui, 2013; UN-DESA, 2005; and World Bank, 2012). This relates

firstly to NDBs' playing an important role in assisting implementation of national development strategies, which is helping improve financial inclusion in those sectors traditionally excluded from the formal financial sector, such as the rural sector. Financial inclusion for SMEs is a pre-requisite for productive development, innovation, and higher productivity. In turn, financing microenterprises is critical for poverty reduction and for improving the low-quality standards that characterize self-employment in developing countries. In non-inclusive financial systems, it is normally small firms and poor individuals that do not have access to finance. This in turn is a mechanism that reinforces inequalities. In many emerging economies, and even in some developed ones, access to finance both by individuals and small firms is still an issue that needs major policy action, especially but not only during and after financial crises or downturns. In general, financial systems in developing countries exhibit problems of segmentation and exclude broad segments of the productive sector such as micro, small and medium-sized firms.

SMEs play a crucial role in most market-based economies as providers of employment and income opportunities and as vehicles of innovation and growth. On average, SMEs account for 45 and 67% of total formal employment in the manufacturing sector of high-income countries and developing countries respectively, as well as contributing to sizable shares of GDP (Financial Inclusion Experts Group 2010).

SMEs consistently report having severe obstacles in their access to finance in comparison to larger firms, which limit their ability to grow. In turn, the higher financing obstacles are reflected in their financing pattern, as they tend to use

significantly less external funding than larger firms for both working capital and fixed asset investment, and tend to finance the latter with a very large component of short-term financing.

Cross-country evidence shows that the gap in access to financial credit between SMEs and large firms is much smaller in higher-income countries than in emerging ones. Nevertheless, the Eurozone debt crisis has reduced access to private credit for SMEs, especially in the crisis countries, showing that even developed economies are not immune to cyclical downturns of such credit, requiring compensating actions by public development banks.

The problems faced by microenterprises, including family agriculture, are even more severe than those of SMEs, and tend to make these agents highly dependent on informal channels of financing. In this regard, it is important that a broad view of financial inclusion be taken, embracing old and new agents active in small scale financing –credit unions and microfinance institutions, for example—but also the mainstream financial sector (both private and public).

When access to external funding is limited, the production capacity of firms and their ability to grow and prosper is constrained, as they have to rely on their own resources to operate. This creates a vicious cycle that maintains smaller production units in a permanent state of vulnerability and low growth with large social consequences in terms of poverty and inequality.

However, it is important to emphasize that credit to micro and SMEs should meet the standards of creditworthiness, and thus the capacity of these enterprises to pay back. There is broad evidence that this is quite frequently the case, and can be enhanced by the design of appropriate guarantee funds for these firms. In broader terms, services to these agents must be provided responsibly, sustainably, and in a well-regulated environment.

A common rationale for development banks and similar institutions in industrial and developing countries alike is to provide financing for micro and SMEs, which tend to be too small (implying high transactions costs) and risky to be of interest to most commercial lenders. Many of these firms can be viable institutions, and in the case of microenterprises move from subsistence to competitive firms. Furthermore, many SME start-ups do not survive very long, yet they can generate benefits going beyond their lifespan. Private markets will thus tend to under-invest in all these enterprises. Public development banks, or special mechanisms that focus on lending to micro and SMEs are designed to overcome this market failure by designing their lending and other facilities to meet the particular needs of their small business clients, including providing technical support.

Although lending to micro and SMEs is risky, experience has shown that it can be done on a commercially viable basis. For example, the Business Development Bank of Canada (BDC) is required under federal law to return a profit to its only shareholder, the Federal Government, a requirement it has met annually for the past decade. It has been able to do so because it operates independently, at arm's length and without interference from government (Culpeper et al, 2016).

Not all national development banks are necessarily well positioned to meet the financial needs of small businesses. In this context, other kinds of intermediaries such as credit unions and community-based banks may offer valuable insights and channels on how to meet the financial needs of micro and SMEs. So, access of these agents to rediscounting as well as direct lending from NDBs is crucial. On the recipient side, it is important that different forms of association of producers be used as agents of inclusion, as they may be the appropriate mechanisms to reach the poorest producers.

Furthermore, according to Mazzucato and Penna (2016), there is an additional challenge to detect, finance and follow up on those SMEs with the highest growth and innovation potential. Perhaps a combination of criteria is desirable here: fund SMEs that seem commercially viable, generate sustainable jobs, but give priority to SMEs that seem more likely to grow and innovate. For these companies, providing risk capital (for example in the form of venture capital) is as important as providing them with social capital (for example in form of support for networking and co-management). Furthermore, for national development banks, one of the main challenges when investing in innovation projects is how to cope with not knowing the chances of success –i.e., fundamental uncertainty. As Griffith-Jones et al. (2016) argue, the best response to these possible financial losses is to finance portfolios of SMEs in order to diversify idiosyncratic risks.

Regarding the evidence on the prevalence of SME financing by NDBs, Além and Madeira (2015) show that all eight reviewed banks provide lending to SMEs. Furthermore, the EIB and many NDBs put special focus on SME lending when they

implemented countercyclical policies in the aftermath of the 2007/09 crisis. In the case of the EIB, not only did they increase lending via private banks to SMEs but they also increased the available funds to the European Investment Fund (EIF), which is a specialized fund of funds dedicated exclusively to SMEs, within the EIB group.

Despite the growing consensus on the important role played by NDBs in financing SMEs and their effective involvement in this financing, there is scarce econometric evidence on the differential behaviour of private banks and state-owned banks regarding SME financing. A notable exception is the work by Behr et al. (2013), who focus on small state-owned commercial banks in Germany and find that SMEs are less financially constrained when they have access to these types of banks in comparison to private commercial banks. Furthermore, they find evidence that these state-owned banks neither underperform commercially nor do they take more risks than other banks. In addition, Behr et al. (2017) find that SME lending by these small state-owned commercial banks is less cyclical than lending by cooperative banks.

IV.D. Infrastructure

NDBs are especially well suited for infrastructure financing, as they can provide the long-term financing needed for infrastructure investment to become profitable, given the large scale of the initial investment and the long period of time for amortization. Furthermore, NDBs can finance at relatively low cost, as they often have very high credit ratings (typically as high as their governments) so they can borrow relatively cheaply on capital markets and pass on that cost advantage to their borrowers (Griffith-Jones and Kollatz, 2015).

There is a broader case for NDBs to play an important role in financing infrastructure investment. In this regard, Studart and Gallagher (2016), for example, argue that: “National development banks can play leading roles in reducing costs and identifying risks of projects, leveraging global and local finance, and in governance and leadership on projects and project goals. At their best, national development banks can impart confidence, reduce risks, bring relevant instruments and encourage participation of other sources of financing both at the initial phase and once a project reaches maturity. As honest brokers they can help bring together governments, the private sector, investors and civil society and help establish replicable and scalable models.” They also note a few challenges faced by NDBs to financing infrastructure. A major one is their size relative to countries’ investment needs. This goes beyond a simple balance sheet constraint but, with a small size, limits the “capacity to engage in an efficient manner with project identification, design, and beyond.”

Before the 2007/09 North Atlantic financial crisis, private investors financed a fairly high volume of infrastructure in emerging economies. Banks and other private investors granted loans with long maturities, which were refinanced by them with shorter tenors on the capital markets. When the crisis emerged, the maturity mismatch turned out to be one of the reasons for rapid contagion, because refinancing was far more difficult. Following the crisis, banks have reduced the maturity mismatch and new regulation seems to be forcing them to do so even further. Though this is good for financial stability, it will reduce the supply of long-term private financing for infrastructure projects, especially in the short to medium term. This accentuates the “good-time” problems facing pure private infrastructure finance in emerging, and

sometimes even in developed, countries, such as “long maturities” and “big tickets”, particularly in certain sectors with high, perceived risks.

This limitation of private lending, combined with the massive need for infrastructure in the emerging and developed world (see below), strengthens the case for enhanced financing by NDBs, their close collaboration with the private sector to achieve valuable leverage, as well as with MDBs, including regional development banks (like CAF, that has played a major role in infrastructure in Latin America). The creation of new MDBs, such as the New Development Bank (NDB) and the Asian Infrastructure Investment Bank (AIIB), initially mainly devoted to infrastructure, shows the importance attached, for example in Asia and among the BRICS to the area of infrastructure. Similarly, the European Union has launched major initiatives to enhance the role of the EIB and NDBs in financing infrastructure.

NDBs face some restrictions in their ability to provide support to infrastructure but nonetheless have numerous advantages regarding financial terms, information and ability to cope with risk, which implies that they can play a significant catalytic role. This will particularly be the case if NDBs continue to move toward developing an appropriate mix of traditional long-term loans with other financial instruments to achieve project closure, such as equity investments, guarantees or partnerships. NDBs have unexploited potential to ramp up the use of instruments that can leverage greater volumes of private sector lending. However, the risks of non-traditional financial instruments are significant, so caution is needed in their application, to avoid excessive contingent liabilities (for further discussion of these issues, see Griffith-Jones and Kollatz, 2015).

A key issue in infrastructure finance is the design of instruments such as guarantees, which involve NDBs assuming enough risk to make the investment attractive for private lenders and investors, but do not imply excessive future risk for the NDB or the government, via contingent liabilities. This can be complemented by attempting to design instruments that help the NDBs and the government “capture the upside” for those projects that become more profitable than expected.

In infrastructure, the type of risks varies through the cycle of the project, and therefore NDB mechanisms may need to vary with the stage of the project, including in the crucial preparation stage. As discussed in *Bhattacharya, Romani and Stern (2015) and others*, there are different stages of infrastructure projects and the risks and financing considerations involved vary for each stage.

Two parameters (maturity and scale) are simultaneously crucial for the development of infrastructure, as the investment normally is high up front, the construction period can be very long, and the amortization time usually required is also long. So, financing by public banks and/or governments may be needed to overcome market gaps or imperfections, such as lack of large-scale long-term finance. In some cases, especially in green infrastructure (see below), NDBs and governments are better to deal with externalities, where social costs and benefits differ from private ones. This is also true for strategically important infrastructure, for example linking several countries, which implies large benefits, but may impose additional risks, due to different regulations in different countries.

In the past, a high share of infrastructure was financed by public budgets. But the demand for infrastructure cannot be served by budgets alone. On the contrary, since the 2007/09 North Atlantic financial crisis, constraints (real and perceived) on budgets in many countries across the globe have led to reduction in investments financed by public budgets, with negative effects on output, private investment, increased unemployment, and future growth, as IMF (2015), and many others have pointed out. Furthermore, existing MDBs, whilst playing a valuable role in funding infrastructure, can only finance a part of the vast needs for infrastructure financing of developing and emerging economies. NDBs can play a key role in general in helping fund infrastructure, and thus complementing public and private investment in infrastructure, but also especially in fiscally difficult times; they can do this well, particularly in cases where they have previous accumulated expertise and have access to long-term funding.

According to Bhattacharya and Holt (2015), there are vast unmet infrastructure needs in both emerging and developing economies, which will constrain these countries' growth if not met soon and on a sufficient scale. They estimate the gap between current and required investment in infrastructure in those countries to reach between US\$1 and US\$1.5 trillion per year for the core infrastructure sectors only between 2014 and 2030. Other estimates are even higher. For example, Studart and Gallagher (2016) estimate up to \$ 3.5–4.0 trillion for infrastructure investment needs each year for the next 15 years in emerging market and developing countries; as current levels are about \$1 trillion per year, this implies unmet needs of \$2.5-\$ 3.0 trillion per year.

The magnitude of the unmet needs provides a clear rationale for NDB activity to help, together with other actors, fill this massive unmet gap in infrastructure financing currently existing.

IV.E. Financing the provision of global public goods

A final and extremely important area of engagement for the NDBs in the coming decades relates to combating climate change, perhaps the most crucial “global public good” of our time.

The international community has defined preventing and adapting to climate change as a major new priority, given the great urgency of the subject. Indeed, the aim of “sustainable” growth makes environment issues central to development strategies, so as to balance climate and environmental needs with economic growth.

Because the NDBs bring the advantages of accumulated expertise, administrative efficiencies, and convening power, they can play an important role. They can help mobilize additional funding, design the necessary policy frameworks, and implement effective projects that can showcase the viability of certain green investment, as in renewable energy (see Spratt, Griffith-Jones and Ocampo, 2013). Above all they can help ensure that a sustainable climate policy is wholly compatible with, indeed facilitates, the achievement of the post-2015 global development goals and the Paris agreement. Given these advantages, some elements for a strategy for the NDBs to combat climate change could include:

i) *Mainstreaming climate change into current policies and operations.* To begin with, in conformity with the Hippocratic principle, the NDBs should “do no harm.” This is more than a platitude when it comes to otherwise meritorious development projects that nonetheless lead to, or do not try to limit, greenhouse gas emissions. The NDBs are in a key position to pursue low carbon options that also support poverty reduction and other development objectives. In this sense, the traditional financing role of the NDBs should be adapted to incorporate environmental externalities and to facilitate the introduction of required technologies –e.g., for renewable energy, even when this is less commercially attractive in the short term. Of particular relevance to emerging economies, in relation to externalities, is the opportunity to “leapfrog” by immediate adoption of post-carbon technologies. Not only will this contribute to the adaption to and mitigation of climate change globally, but it will also avoid the transition costs that are being incurred by developed nations today and that would be required to be incurred where carbon-based technologies are adopted instead.

ii) *Green initiatives by NDBs.* It seems especially valuable when NDBs, jointly with the government, which designs the policy framework, and with the private sector, which plays a large role in financing and implementing, take major, mission-oriented initiatives in the field of green finance, such as building green grids, helping introducing new forms of renewable energy, etc.

An interesting and positive example is the key role that KfW played in the initial phase of introduction of Solar PV to Germany. In fact, KfW funded ALL the investment in Solar PV during 2007-09 in Germany, when solar PV began to be

introduced on a major scale in the country (see Griffith-Jones, 2016, op. cit.). It then played a diminishing role as other, basically private, funding sources stepped in.

Such a catalytic role is precisely what a development bank should do, to kick-start a major structural transformation, by funding and showcasing new technologies and sectors. Thus KfW Germany successfully crowded-in private financing: from 2010, at least half of the new investment in Solar PV came from private or other non-KfW sources.

iii) Adaptation. According to recent estimates on the uses to which the current flow of climate finance is put, \$93 billion of the \$97 billion total is allocated to mitigation; only \$4 billion is allocated to adaptation (Buchner et al., 2011). An emphasis on mitigation initiatives is understandable—it seems more sensible to allocate resources to tackling the problem at its source, rather than to helping victims of climate change. More mitigation today could mean less need for adaptation in the future. But this misunderstands the crucial importance of adaptation today (Culpeper et al, forthcoming).

First, much of the worst devastation caused by climate change will be visited upon the poorest people, who are largely blameless for climate change. Second, “adaptation” is best considered as “building resilience” against climate change, that is, as a strategy to reduce risk, which is essential for all developing countries.

These considerations point to the key role that NDBs (in cooperation with the private sector and MDBs) increasingly need to play in spearheading climate change

prevention and adaptation projects. Mitigation has the characteristics of a global public good, the benefits of which would be universally felt, while adaptation has fewer aspects of a global public good and is more consistent with traditional support for development. But both are crucially necessary, and since the bulk is presently flowing into mitigation, more funding is crucially needed for adaptation (Ghosh, 2010).

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