International Economics xxx (2017) 1–25

Contents lists available at ScienceDirect

International Economics

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

Relaxing credit constraints in emerging economies: The impact of public loans on the productivity of Brazilian manufacturers

Filipe Lage de Sousa [a,c], Gianmarco I.P. Ottaviano [b,d,e,f,*]

[a] Departamento de Economia, Universidade Federal Fluminense, Campus do Gragoatá, Bloco F, São Domingos, Niterói, RJ, CEP: 24210-510, Brazil
[b] Department of Economics, London School of Economics, Houghton Street, London WC2A 2AE, UK
[c] Brazilian Development Bank, Av. República do Chile, 100, Rio de Janeiro, 20031-917, Brazil
[d] University Bocconi, Via Roberto Sarfatti, 25, 20100, Milan, Italy
[e] CEP, Houghton Street, London WC2A 2AE, UK
[f] CEPR, 33 Great Sutton Street, London EC1V 0DX, UK

ARTICLE INFO

JEL classification:
G28
O38
H25

Keywords:
Credit constraints
Firm productivity
Public loans
BNDES

ABSTRACT

In emerging economies credit constraints are often perceived as one of the most important market frictions hampering firm productivity growth in manufacturing. Huge amount of public money is devoted to the removal of such constraints but its effectiveness is still subject to an intense policy debate. This paper contributes to this debate by analyzing the effects of the Brazilian Development Bank (BNDES) loans. Exploiting the unique features of a dataset on BNDES loans to Brazilian manufactures, it finds that credit constraints facing Brazilian manufacturing firms are real, in particular for firms that apply to BNDES repeatedly, and BNDES support has allowed granted firms to match the performance of similar unconstrained firms but not to outperform them.

1. Introduction

Large emerging economies, such as Brazil, China and India, are considered the "markets of the future" as promising destinations for sales as well as worrying origins of new tough competitors. At the same time, manufacturers from those countries feel they are not able to compete on a level playing field with manufacturers from more advanced economies due to all sorts of market failures. In particular, credit constraints are often perceived as one of the most important market frictions constraining innovation, growth and performance as they hamper the entrepreneurial efforts of local firms. While huge amounts of public money are being devoted to the removal of such constraints, their effectiveness is still subject to an intense policy debate. Banerjee and Duflo (2014) is an example of the related recent literature.

The aim of this paper is to contribute to this debate by investigating the case of Brazil. The Brazilian government provides long-term loans through the *Banco Nacional de Desenvolvimento Econômico e Social* (henceforth, BNDES), a development bank whose main statutory goal is to improve Brazilian economic competitiveness without neglecting broader social and environmental aspects.[1] BNDES invests in several areas including research and development, infrastructure, export support, regional and urban development. More specifically, in the case of manufacturing, BNDES finances long-term projects aimed at the creation of new plants, the enlargement of existing ones, the restructuring and the modernization of production processes, innovation and technological development. Projects are supported

* Corresponding author. Department of Economics, London School of Economics, Houghton Street, London WC2A 2AE, UK.
E-mail addresses: fl_sousa@id.uff.br (F. Lage de Sousa), g.i.ottaviano@lse.ac.uk (G.I.P. Ottaviano).

[1] Carvalho (2014) provides a short historical description of BNDES.

https://doi.org/10.1016/j.inteco.2017.11.002
Received 24 April 2017; Received in revised form 26 October 2017; Accepted 13 November 2017
Available online xxxx

through loans at subsidized interest rates. All firms located in Brazil are eligible, including foreign owned ones. Moreover, banks in the private sector tap BNDES resources to provide loans for their clients' long-term projects. As a result, long-term loans in the Brazilian economy are mainly offered by BNDES funds, either by BNDES itself or by other banks using BNDES resources.[2] Unsurprisingly, the importance of BNDES in the Brazilian economy is, therefore, quite sizeable: in 2012 its disbursements reached the value of 76 billion dollars, representing 20% of aggregate investment.[3] When compared with that of other development banks, the size of BNDES financing becomes even more impressive. For instance, in 2012 the World Bank and the Inter-American Development Bank disbursed 19.8 and 6.9 billion dollars respectively.[4] In comparison, BNDES financing reached nearly three times their combined disbursements.[5]

While acknowledging that BNDES project analysis involves several other dimensions including social and environmental aspects, this paper focuses on the narrower assessment of the overall impact on the performance of Brazilian firms in terms of productivity. Do BNDES loans help relax credit constraints that hamper productivity growth in Brazilian firms? We address this question by exploiting the unique features of a micro-dataset drawn from a variety of sources: the Annual Industrial Research of the Brazilian Institute of Geography and Statistics; the Annual Social Information Report of the Ministry of Labor; the Foreign Trade Secretary of the Ministry of Industrial Development and Foreign Trade; the Foreign Capital Census and the Central Bank Register of Brazilian Capital Abroad of the Brazilian Central Bank; and BNDES itself. The period covered is 1995-2007.[6]

Our focus on productivity is driven by the fact that, as already discussed, for manufacturing projects the stated aim of long-term BNDES loans is essentially to enhance physical productive efficiency through the economies of scope and scale associated with the creation of new plants and the enlargement of existing ones, the restructuring and the modernization of production processes, innovation and technological development. In particular, we consider two measures of productivity: 'total factor productivity' (TFP) and labor productivity. TFP is estimated as the firm-level Solow residual following the methodology of Levinsohn and Petrin (2003).[7] It measures how effectively a firm transforms a given amount of inputs into output. Labor productivity is computed as the ratio of firm value added to number of employees. Hence, TFP is closer to the long-term concept of physical efficiency whereas labor productivity is more of a short-term concept.[8]

Even though there is a growing literature evaluating government policies for business support (Bronzini and De Blasio, 2006), there is a relative shortage of papers on the specific impact of government policies on private sector development (McKenzie, 2010), especially when it comes to firm productivity (see, e.g., Grilliches et al., 2000; Criscuolo et al., 2016). This is not due to a shortage of methods, since other areas have already developed different ways to deal with the issue. An example can be found in the literature in labor economics that evaluates to what extent government polices affect individuals' achievements (Heckman et al., 1999).

In the case of long-term BNDES loans, the specific chain of causation we want to analyse goes from relaxing credit constraints on long-term investment to faster productivity growth. Among the relevant categories of long-term investment, the literature has mostly been interested in those concerning R&D and innovation. The link between innovation and productivity growth is well established, with some recent studies showing that as much as 40% of observed productivity growth can be attributed to R&D and innovation (Hall, 2011; Reikard, 2011; Syverson, 2011; Hall and Mohnen, 2013). However, despite extensive research, empirical findings on the effects of governments' innovation programs are still inconclusive, with results varying a lot across countries (Gao et al., 2016).[9] The role of credit constraints for innovation and growth has been stressed mainly in the development literature. Banerjee and Duflo (2005) provide evidence that firms in many developing countries face credit constraints, using a sample of countries including Brazil. In the specific case of Brazil, Terra (2003), Aldrighi and Bisinha (2010) and Ambrozio et al. (2017) find evidence of credit constraints by investigating the issue at the firm level. More generally, Aghion et al. (2010) show that tighter credit constraints discourage firms' long-term investments by increasing the corresponding liquidity risk. In the trade literature, there is also evidence that credit constraints hamper firms' efforts to export (Manova, 2013). According to this paper, there are three mechanisms through which credit constraints affect trade: selection of firms into domestic production; selection of domestic producers into exporting; and, last but not least, how much a firm exports. Results show that credit constraint affect these three mechanisms, especially at the level of firms' exports. In the case of Brazil, it has been found that exporters face lower credit restriction in the Brazilian economy, and even small and middle size firms are not credit constrained if they export a relevant part of their sales (Ambrozio et al., 2017).

BNDES effects on the Brazilian economy have been investigated both in the national and the international literature. Recent examples of the latter include the studies by Bandeira-de-Mello et al. (2015), Carvalho (2014) and Bonomo et al. (2015). Bandeira-de-Mello et al. (2015) evaluate BNDES loans with reference to a range of firm performance indicators, including profitability and investment. Carvalho (2014) investigates whether elections shift investments supported by BNDES towards politically attractive regions. Bonomo et al. (2015) study whether BNDES loans affect firms' investment.[10] None of these papers, however, assesses the impact

[2] See De Bolle (2015) for a detailed discussion of how BNDES interest rates are subsidized and their impacts in the credit market.

[3] Information accessed on December 22nd, 2016 at BNDES website (www.bndes.gov.br).

[4] According to World Bank (2013) and IADB (2013).

[5] In their survey on development banks Luna-Martinez and Vicente (2012) classify BNDES as a 'mega-bank' together with other large development banks, such as the China Development Bank and Kreditanstalt für Wiederaufbau (KfW) from Germany.

[6] A full description of our data sources is presented in Section 3.

[7] Though the methodology by Levinsohn and Petrin (2003) is a standard procedure in the TFP estimation literature, we provide a description in Appendix VI for completeness.

[8] See Bronzini and De Blasio (2006), Criscuolo et al. (2016) and Banerjee and Duflo (2014) for assessments in terms of other short-term performance variables such as employment, investment or revenue.

[9] In the case of Latin American countries, Crespi et al. (2014) list a number of papers in which innovation policies are found to have a positive impact on firm performance.

[10] For the national literature, see the references in Lage de Sousa and Ottaviano (2014).