5.4. Is bank credit going to the most productive firms?

Nuno Azevedo, Márcio Mateus, Álvaro Pina[34]

1. Motivation

Long-term economic growth largely depends on the ability to channel resources to high-productivity firms, enabling them to invest and expand. Banks play a prominent role in resource allocation, especially in economies, such as those in the European Union, which are heavily reliant on bank lending. The degree of efficiency in the allocation of bank credit will thus have major consequences for a country's prosperity.

Resource misallocation, especially as regards credit, is all the more worrying as it can be self-reinforcing. A proliferation of low-productivity firms tends to congest markets, hampering the entry or growth of more efficient competitors (Caballero *et al.*, 2008; Adalet McGowan *et al.*, 2017). Bank support to those firms through successive loans, itself a cause of that proliferation, also implies long-lasting credit misallocation and may decrease credit availability for more productive companies.

This Section, based on Azevedo *et al.* (2018), tries to shed light on two related questions. First, how the stock of outstanding credit granted by banks operating in Portugal to non-financial corporations is allocated across firms of different levels of productivity. Second, whether changes in that stock respond positively to firm productivity, thus inducing credit reallocation towards more productive firms, and how that response is affected by the existing allocation.

The linkages between credit allocation and productivity have particular relevance in Portugal. Recent years have seen positive developments, such as a growing allocation of new bank loans to lower risk firms (which tend to be more productive), and, since 2016, a substantial reduction in the stock of non-performing loans (Banco de Portugal, 2017, Banco de Portugal, 2018a). However, important challenges remain. The relative importance of non-performing loans

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34 Álvaro Pina was working at Banco de Portugal when this Section was written.

in banks' balance sheets is still among the highest in the euro area (Banco de Portugal, 2018a).[35] Furthermore, several studies have documented worsening resource misallocation in the Portuguese economy in the first decade of this century (Dias *et al.*, 2016; Gopinath *et al.*, 2017; Reis, 2013), with moderate subsequent improvement in some sectors (Dias and Marques, 2018). However, these studies, unlike ours, have not put together firms' accounting data and data on credit granted by banks.

2. Data

Our sample has largely come from matching two Banco de Portugal datasets of virtually universal coverage for Portugal in 2006-2016, *Central de Balanços* and the Central Credit Register. The former is based on the Simplified Corporate Information (IES) annual reporting of firms balance sheet and income statement variables. We use this data *inter alia* to classify firms into sectors (64 altogether) and to estimate each firms' productivity. More technically, we compute total factor productivity (TFP) based on a production function where gross value added (GVA) depends on employment (L) and the capital stock (K, measured as the book value of tangible and intangible assets, net of depreciation). From the credit register we get end-year outstanding loans (performing or not) granted to firms by credit institutions operating in Portugal. We aggregate individual credit institutions into the eight largest banking groups plus a ninth, residual group comprising the rest of the banking system (these groups are henceforth referred to simply as banks).

To maximize credit coverage, our sample also includes firms with outstanding loans which do not report accounting data (IES). The ensuing dataset covers about 95% of total outstanding credit to non-financial corporations recorded in the credit register (the gap to full coverage is mainly explained by the exclusion of a few sectors for technical difficulties in productivity estimation).

3. Credit allocation to firms of different productivity

It is not possible to compute productivity for all companies, notably (but not exclusively) for those that do not report IES. Our strategy to characterize credit allocation is then to classify firms into seven

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35 International comparisons of non-performing loans (NPLs) should be regarded with caution, as the implementation of the NPL definition involves judgement and is therefore not fully harmonised across countries.

		Zombies	Non-zombies
Firms with IES reporting	GVA, K, L >0	9903	185584
	GVA, K>0, L=0 or missing	745	14597
	GVA ⩽ 0 or K ⩽ 0	19763	128716
Firms without IES reporting but with outstanding loans		48166	

Table 10: Number of firms in each of the 7 categories ∣ 2016

Note: Shading is applied to categories deemed unproductive (see text for details).
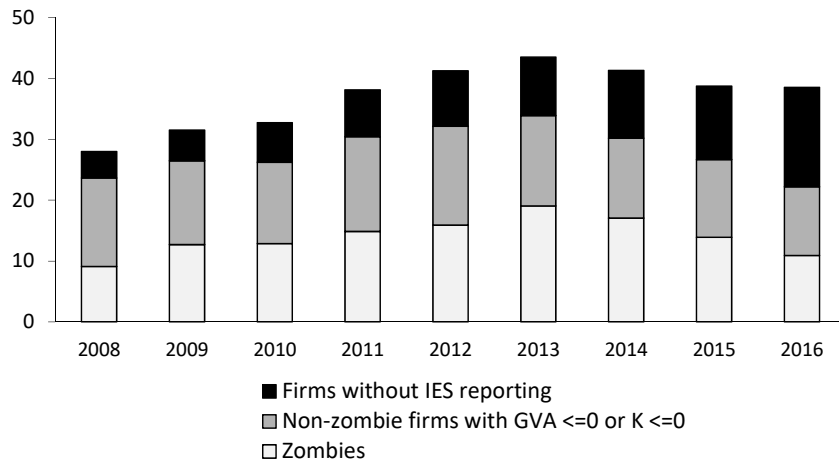

Figure 40: Share of unproductive firms in total bank credit to firms ∣ Per cent

different categories, and assess which of these have, or are likely to have, very low productivity. Firms in these categories will be labelled as unproductive firms.

Categories are defined on the basis of (i) whether firms report IES, (ii) the values of the three key variables for productivity estimation (gross value added, employment and the capital stock) and (iii) whether firms are zombie. The latter are old, financially fragile firms often kept alive by banks, which successively grant them credit to delay the eventual recognition of losses ("new loans to repay old loans"). Based on Adalet McGowan *et al.* (2017) and similarly to what is done in Section 6.2, we consider that a firm is a zombie if it is at least 10 years old and has operating income below interest payments for three consecutive years.

Table 10 summarises the seven categories, shades those unproductive, and shows how many firms each category comprised in 2016. Productivity (TFP) can be computed for firms with positive value added, employment and capital stock. It may be higher or lower, but

	Obs	Average	St. dev.	P10	P25	P50	P75	P90
By 2-digit sector (S)	512	25.2	15.2	8.8	14.9	22.8	31.8	46.3
By bank (B)	72	36.5	8.5	26.2	30.3	36.2	43.4	48.1

Table 11: Share (%) of bank credit allocated to unproductive firms | Descriptive statistics, 2008-2015

there is no reason to regard these firms as a whole as unproductive, except for those which meet the zombie criteria (which actually display much lower productivity). In contrast, productivity cannot be computed for firms with positive value added, positive capital stock and zero employment, but the absence of personnel could be due to technology rather than to low productivity (e.g. a wind farm). However, when firms display zero or negative value added or capital stock, their productivity inspires concerns: their ability to create value is probably very small, and fully depreciated machinery (zero capital stock) does not bode well for the efficiency of operations. A final category is that of firms without IES reporting, an absence which often persists for several years. These firms may be facing difficulties, linger in semi-informal activity, or have already closed down (leaving unpaid loans). They are therefore deemed unproductive.

There is evidence of substantial misallocation of bank loans, in the sense that a large share of outstanding credit is owed by firms of very low productivity (Figure 40). This share increased from 2008 to 2013, as the recession got worse, and declined afterwards.[36] Less than half of this credit lies with zombie firms, which underlines the relevance of the broader concept of unproductive firms. Furthermore, the share of unproductive firms in bank credit is larger than their share in the capital stock or in employment (Azevedo *et al.*, 2018).

Credit misallocation is especially large in construction and real estate, but also a concern in many other sectors (Figure 41). Variation in the share of credit allocated to unproductive firms is larger across sectors than across banks, where it is nonetheless substantial (Table 11). The next section studies how this variation matters for changes in credit.

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36 In the final year considered (2016), the share of credit allocated to firms without IES reporting is somewhat overstated, since (i) some firms have likely not complied with the deadline for IES reporting but will have reported later and (ii) some other firms have a later deadline due to non-coincidence of their fiscal year with the calendar year. In both cases, later reporting has not been taken into account.
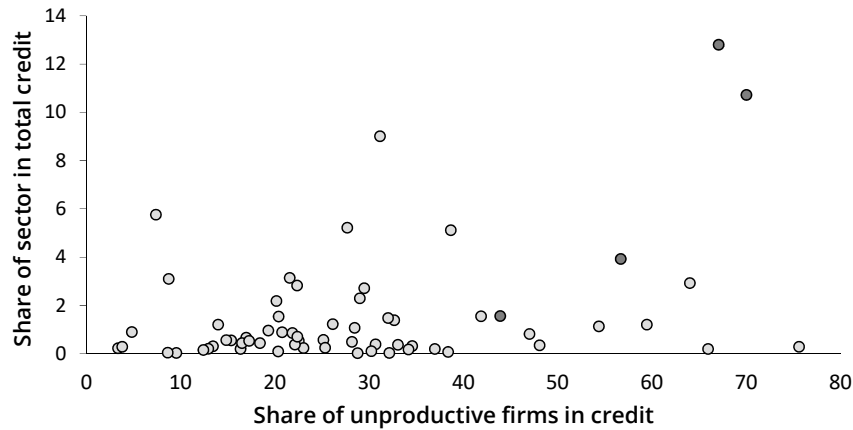
Figure 41: Share of unproductive firms in total bank credit to firms by 2-digit
sector | 2016, per cent

Note: Construction and real estate sectors are marked in dark grey.

4. Credit reallocation to firms of higher productivity

To study credit reallocation, we estimate an econometric model measuring the response of credit growth to firm productivity, and how that response is affected by the share of credit allocated to unproductive firms. "Credit growth" is (approx.) the percentage change in outstanding credit to firm i by bank b from year $t-1$ to t. "Firm productivity" is (approx.) the percentage deviation of firm i's TFP from its sector average in $t-1$ (using productivity in t would cause circularity problems, as it might depend on credit growth). The share of credit allocated to unproductive firms (also in $t-1$) is defined both by sectors and by banks and denoted respectively by S and B (recall Table 11).

The econometric model also takes account of firm age and size, unobserved time-varying sector-specific shocks (e.g. stemming from the business cycle) and unobserved time-varying bank characteristics.

The response of credit to productivity will depend on the estimated coefficients and on the shares S and B. Credit growth will not depend on productivity alone, but also on the variables mentioned in the previous paragraph. However, if for a pair of firms all these variables are identical, the expected *difference in credit growth* between one firm and the other will only depend on (i) the response of credit to productivity (which will be sector- and bank-dependent) and (ii) the difference in productivity between the two firms. To summarise econometric results, we focus below on this difference in credit growth.
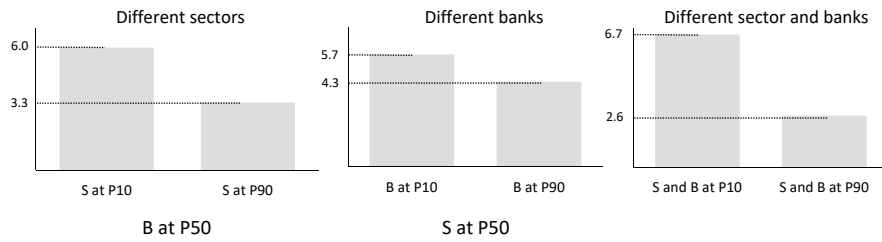
Figure 42: Difference in credit growth between a more productive and a less productive firm | Percentage points

Notes: B denotes the credit share of each banking group granted to unproductive firms. S stands for the share of bank credit to sector s allocated to unproductive firms.

Take then two firms of the same age and size classes, operating in the same sector and borrowing from the same bank. One is more productive (being at the 75th percentile – P75 – of the statistical distribution of firm productivity) and the other is less (at P25). Their difference in credit growth will depend on whether the firms' sector has high or low S, and the lending bank high or low B. If S is high (i.e. if firms operate in a sector where a lot of credit lies with unproductive firms), say 46%, at P90 of the cross-sector distribution (Table 11), the difference in credit growth will be 3.3 percentage points (p.p.; Figure 42, left panel). This is compatible with credit growth of 7% for the more productive firm and 3.7% for the less productive firm, or with credit growth of 1% and -2.3% respectively. In contrast, if S is low, say 9% (at P10), the difference in credit growth between the more and the less productive firms increases to 6.0 p.p.. A similar exercise can be performed for B (Figure 42, middle panel), showing that a higher share of loans to unproductive firms in the credit portfolio of the lending bank also reduces the difference in credit growth between the two firms. Unsurprisingly, taking high *versus* low values of both S and B yields a sharper contrast (Figure 42, right panel), and the gap in the difference in credit growth between the more and the less productive firms reaches about 4 p.p. (6.7 minus 2.6 p.p.). This gap decreases to about 2.5 p.p. if the econometric model is re-estimated without firms operating in construction and real estate.

Therefore, we conclude that existing credit misallocation (i.e., high values of S and B) can substantially hamper credit reallocation by muting the response of credit growth to firm productivity.

5. Interpreting the results

The allocation of credit depends on both credit supply and credit demand. Supply decisions, taken by banks, may first come to mind, but demand decisions, taken by firms, should not be forgotten. For example, some Portuguese companies have in recent years increasingly obtained funding in international capital markets (Banco de Portugal, 2018b), which likely decreased their demand for loans granted by banks operating in Portugal. An increase in own funds through retained earnings, as has been the case with Portuguese SMEs in recent years, may also weigh on credit demand.

Multiple supply and demand decisions taken in different moments of time, when outstanding loans were granted, are behind the credit allocation observed in a given period. A high share of credit sunk in unproductive firms may reflect bad decisions at the time of loan origination, but also the impact of subsequent events. For instance, a deep economic crisis, following a long accumulation of imbalances by the Portuguese economy, helps explain the sharp increase in the credit share of unproductive firms in 2008-2013 (Figure 40). In turn, poor credit demand and credit supply decisions have likely contributed to the almost 30% share of unproductive firms in total credit to firms in 2008 (Figure 40), when the worst of the crisis was still to come.

Credit reallocation also reflects the joint forces of supply and demand, which our econometric model does not attempt to disentangle. This forces us to be tentative when interpreting the negative impact of credit misallocation on the responsiveness of credit to productivity. Nonetheless, some possible explanations emerge. At bank level, a poor credit portfolio may lead banks, in order to delay loss recognition, to keep lending to the same unviable firms or to postpone write-offs of loans unlikely to be ever repaid, though stepped up supervisory action, especially since 2016, has curbed this behaviour.[37] At sectoral level, congestion effects (stemming from a proliferation of low-productivity firms) may help explain hampered reallocation: healthy firms find it harder to grow (e.g. since surviving inefficient firms take some market share) and hence demand less funding (from banks or from other sources), while banks, aware of low profitability in the sector, may also restrict credit supply.

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[37] For example, some of the main banks have become bound to comply with NPL reduction plans submitted to supervisory authorities (Banco de Portugal, 2018a).

6. Final remarks

Despite welcome developments, such as a shift in new loans from higher to lower risk firms since 2013, there is still substantial credit misallocation in the Portuguese economy: a large share of outstanding credit granted by resident banks to non-financial corporations lies with categories of firms which have, or are likely to have, very low productivity. In addition, the credit share held by these unproductive firms has been found to hamper credit reallocation: the positive response of credit growth to firm productivity becomes smaller, and the flow of credit to efficient firms (relative to inefficient ones) is thus slowed down. Among other constraints, many of which are discussed in different Sections of this book, this slower reallocation may make it harder for the best firms to invest and upscale.

Credit reallocation to productive companies should go hand in hand with further rebalancing of the financing structure of firms as a whole towards own funds and away from debt. Despite significant progress on this front since 2012, especially for SMEs, Portuguese firms are still highly indebted (and, concomitantly, poorly capitalized) by European standards. This may deter investment and leaves the economy more vulnerable to adverse shocks (Banco de Portugal, 2017). Therefore, better credit allocation and higher firm capitalization are twin levers not only for a more resilient banking system but also for stronger economic growth.

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