## 6.2. Are zombie firms curbing the growth of viable firms?

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### 1. Motivation

Productivity is slowing down: the average annual growth rate of GDP per hour worked declined from above 2% in the early 1990s to below 1% in the past decade (Figure 45). Given the key contribution of productivity to living standards, it is important to understand the drivers of these developments, which are not exclusive to Portugal. Despite the progress in information and communication technologies, the increased participation of firms in global value chains and a better than ever educated workforce, a similar pattern can be observed in other OECD countries.

One driver of what is known as the "productivity paradox" relates to a breakdown of technological diffusion mechanisms, translating into the emergence of "winner takes it all" dynamics - where one or few firms dominate the market. Firms below the technological frontier are no longer able to learn from top-performers and therefore cannot catch-up and grow. Relying on Portuguese firm-level data, one sees that the productivity growth slowdown is, in fact, not broad-based (Figure 46): while the most productive within each sector continue to grow, the others are stagnating.

Another driver relates to a depressed creative destruction process, where firm dynamics are curtailed, leading to lower entry in the market, lower exit and fewer opportunities for the best firms to grow. An increasing body of research corroborates this channel, uncovering a rising capital and labor misallocation. This trend is also visible for Portugal, both across sectors (Reis, 2013; Benigno and Fornaro, 2014) - in particular towards non-tradables - and within sectors (Dias et al., 2014; Gopinath et al., 2017), with within industry misallocation almost doubling between 1996 and 2011. Institutional bottlenecks create the conditions for non-viable firms to remain in the market. The seminal work carried out for Japan's macroeconomic stagnation in the 1990s (Caballero et al., 2008; Hoshi and Kashyap, 2004) stresses the negative effects of these unviable firms - the so-called "zombies"-
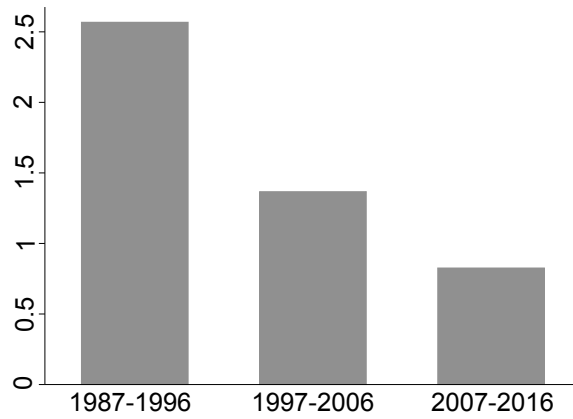
Figure 45: Average annual productivity growth in % (GDP per hour worked)
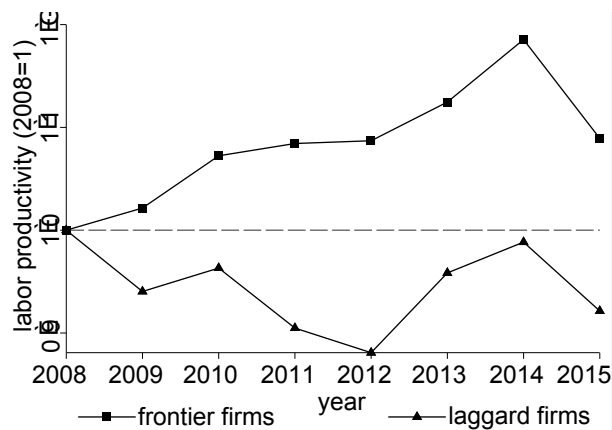
Source: OECD.



Figure 46: Firm level productivity - frontier v. laggards

Notes: Gross value added per hour worked. Frontier firms are the 10% most productive within each sector; laggard firms are all others.
Source: Authors' computations based on IES.

on the economy. They not only drag down aggregate productivity directly (by being less productive), but also hamper the growth of healthy firms by crowding out financing and human capital and by congesting markets. Recent studies revived the analysis of zombie firms for OECD countries (e.g. Adalet McGowan et al., 2017a/b), corroborating earlier findings.

To take action, it is essential to understand the institutional drivers of zombie prevalence. The literature points to the role of banks, which under some circumstances may promote the misallocation of resources (e.g. Storz et al., 2017 and Acharya et al., 2017). Financial frictions harm the most vulnerable firms, not necessarily the least

productive (Duval et al., 2017), and foster - at the expense of healthy firms - the survival of firms that should otherwise leave the market, as weaker firms are associated with weaker banks (Schivardi et al., 2017). While promoting bank health is certainly part of the answer on how to address zombie prevalence, lower exit and restructuring barriers constitute another important element, by reducing zombie congestion (Adalet McGowan et al., 2017b) and increasing the incentives for banks to initiate restructuring (Andrews and Petroulakis, 2017).

This Section, based on Gouveia and Osterhold (2018), aims at assessing the impact of zombie firms in the Portuguese economy and the role of public policy to reduce their prevalence. We document three main results: (i) in some sectors, there is a high prevalence of zombies among Portuguese firms; (ii) the zombie prevalence has been curbing the growth of viable firms, in particular the most productive; and (iii) the reduction in exit and restructuring barriers is promoting a more effective exit channel and the restructuring of the most productive firms, allowing for a reduction of zombie prevalence and thereby potentiating productivity growth.

## 2. Method and results

### 2.1. *Data*

The main data source in this Section is *Informação Empresarial Simplificada* (IES) provided by *Banco de Portugal*. IES consists of annual firm-level accounting data for firms operating in Portugal. We consider the period 2006-2015 and the firms operating in the sectors corresponding to the NACE codes 10-83, excluding 64-66. Agriculture, mining, the financial sector and non-market activities (such as health or education) are excluded. Observations with negative or nil values for turnover, assets, tangible assets, total workers, paid workers, worked hours or labor costs are dropped. Values are deflated using information from Statistics Portugal.

### 2.2. *Zombie prevalence*

To assess zombie prevalence, it is crucial to quantitatively define a zombie. In economic terms, a zombie is a non-viable company that, when competitive forces are at play, should be compelled to exit the market or, where feasible, restructure. The literature offers different possibilities to operationalize this concept (see Adalet McGowan et al., 2017a). We follow the OECD definition, whereby a firm is clas-

sified as a zombie if (i) the operating income is lower than interest expenses for at least three consecutive years and (ii) the firm operates for more than 10 years. The first condition identifies firms that do not generate enough cash-flow to service the debt and the second avoids erroneously classifying firms such as start-ups as zombies (a zombie is, by definition, a company that remains in the market for a prolonged period, despite not being viable).

By applying this definition, we find that, in Portugal, zombie firms account for 6.5% of the firms operating in 2008, increasing steadily to 8.5% in 2013. Since then, the weight decreased, reaching close to 6% in 2015.[38] These figures are, however, poor measures of zombie prevalence. In our dataset, zombie firms are not only less productive than their healthier counterparts in the same sector, but they are also larger. Their economic weight is thus better ascertained by measures of zombie congestion that consider their relative size.

We thus build two measures of zombie congestion of production factors at sectorial level: the weight of zombie firms' tangible assets in relation to total tangible assets in the sector; and the share of workers employed by zombies in relation to all workers in the sector (Figures 47 and 48). We show that (i) zombie prevalence, measured by the resources they capture, is high, reaching in some industries more than 20% of tangible capital and of total workers employed in the sector; (ii) there are important differences across sectors: for instance, while in consultancy and scientific activities only 5% of labor and 9% of capital is taken by zombies, the shares rise to 23% and 27%, respectively, for the case of accommodation and food services; and, finally, (iii) in most sectors (but not in all), there is a reduction of zombie congestion from the peak of 2013.[39]

Overall, these results are consistent with OECD findings, pointing to cross-country regularities. Zombie firms are, on average, larger companies and significantly less productive than their healthy counterparts, pushing labor productivity down. Furthermore, there is

38 This pattern is similar to that of other countries, such as Spain, Belgium and Italy (Adalet McGowan et al., 2017a). It should be noted that a direct comparison with the figures obtained for other countries is not meaningful as the levels obtained in different studies depend on the definition of zombies and on the sample of sectors and firms taken (e.g. some studies rely only on firms with 10 or more employees).

39 For presentational purposes, we aggregate data at the branch of activity CAE letter code, whereas in the analytical part that follows we use the more detailed 2-digits breakdown. Industries, with weights in 2015 turnover: C - Manufacturing (27%); D - Electricity, gas, steam and air conditioning supply (4%); E - Water supply, sewerage, waste management and remediation activities (1%); F - Construction (5%); G - Wholesale and retail trade, repair of motor vehicles and motorcycles (43%); H - Transportation and storage (5%); I - Accommodation and food service activities (3%); J - ICT (5%); L - Real estate activities (1%); M - Professional, scientific and technical activities (3%); N - administrative and support service activities (3%).
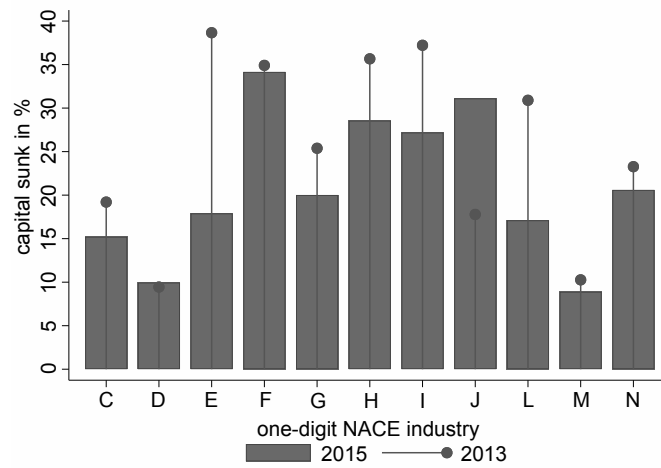
Figure 47: Capital sunk - industry level

Note: For each branch of activity the Figure displays the share of tangible assets held by zombie firms.

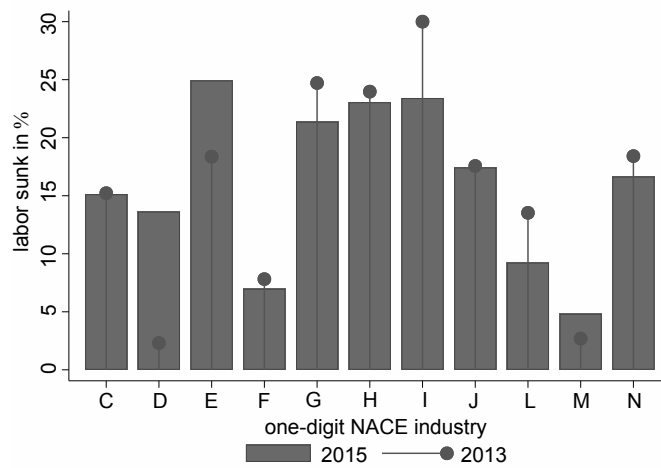Source: Authors' own computations based on IES.



Figure 48: Labor sunk - industry level

Note: For each branch of activity the Figure displays the share of workers employed in zombie firms.

Source: Authors' own computations based on IES.

evidence of distortions at the exit margin, as zombies remain in the market and absorb a significant part of production factors, with high heterogeneity at sectorial level.

2.3.   *The impact on healthy firms*

We estimate a reduced-form equation on the impact of zombie congestion on investment and employment growth of the average non-zombie firm:

$$
\begin{aligned}
\delta Y_{i,s,t} = {} & \beta_0 + \beta_1 \text{nonzombie}_{i,s,t} + \beta_2 \text{nonzombie}_{i,s,t} \times RS_{s,t} \\
& + \beta_3 \text{Firmcontrols}_{i,s,t-1} + FE_{s,t} + \varepsilon_{i,s,t}
\end{aligned} \tag{15}
$$

where $\delta Y$ denotes tangible capital or employment growth of firm $i$ in a 2-digit sector $s$ in year $t$. The dummy $\text{nonzombie}$ signals non-zombie firms. $RS$ is the share of sectorial resources sunk in zombies, which, depending on the specification, is measured either as capital sunk or labor sunk.[40]

By estimating this equation, we find a negative $\beta_2$, which signals that the investment of the typical Portuguese healthy firm (in relation to that of zombies within the same sector) is negatively affected by the resources - capital or labor - sunk in zombies. As an illustration, the capital growth differential between a non-zombie and a zombie is 0.9 pp lower in the textile sector vis-à-vis the consulting sector (capital sunk in textiles is close to 20% while it is around 10% in consulting). There is, however, no effect on relative employment growth for the average non-zombie, which may reflect the relative flexibility of capital in comparison to labor.

While assessing if the impact on the average firm is informative, it is important to understand the consequences of zombie congestion across the productivity distribution. In the absence of distortions, one expects the most productive firms to grow faster than the less productive. In an alternative specification that takes into account labor productivity differentials, we show that capital sunk in zombies limits this reallocation towards the most productive, both in terms of capital and employment growth. The results are likely driven by reduced access to finance, which hampers investment and firm growth and thereby also limits employment growth. Indeed, we do not find evidence of effects from labor congestion.

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40 Firm controls include age, number of workers (as a measure of firm size) and turnover growth (as a proxy of growth opportunities). We include two-digit industry-year fixed effects $FE$ to control for sectorial aggregate shocks and robust standard errors clustered by industry-year. The fixed effects structure implies that the absolute effect of resources sunk cannot be estimated, as it is absorbed by the dummy structure. Therefore, $\beta_2$ captures the effect on the average non-zombie *in deviation* from the effect on zombies (and this it is not an absolute effect).

## 2.4. *The role of public policy*

To assess the impact of the reduction of exit and restructuring barriers on the dynamics of Portuguese firms, we complement the firm-level data with a novel country-level OECD composite insolvency indicator. It is available for 2010 and 2016, ranging from 0 to 1 and increasing in exit and restructuring barriers (see Adalet McGowan et al., 2017b). Based on the timing of the most relevant policy changes - namely in 2012 and 2014-2015 - we are able to annualize the OECD indicator. Portugal registered, according to this indicator, one of the largest improvements among OECD countries.

As the barriers are more relevant for sectors with higher natural turnover rates (entry plus exit rates), we build a sectorial exposure variable using data for the US and the UK (SDBS Business Demography Indicators), two countries which are relatively less regulated and in which the observed turnover rate is likely to approach the natural one. Our identification strategy relies on the assumption that industries more exposed to exit and restructuring barriers (the treatment group) are more affected by changes in those policies in comparison with less exposed industries (control group):

$$
\begin{aligned}
\text{Exit}_{i,s,t} =\beta_0 + \beta_1 \text{zombie}_{i,s,t-1} + \beta_2 \text{zombie}_{i,s,t-1}\times \\
\text{Insolvency}_{t-1} \times \text{Exposure}_s+ \\
\beta_3 \text{Firmcontrols}_{i,s,t-1} + \text{FE}_{s,t} + \varepsilon_{i,s,t}
\end{aligned}
\tag{16}
$$

where $\text{Exit}$ indicates whether firm $i$ in sector $s$ exits the market in year $t$. $\text{Insolvency}$ denotes the level of barriers to exit, $\text{Exposure}$ is the natural sectorial turnover rate, as described above and $\text{zombie}$ identifies zombies.[41] By estimating this specification, we do find a negative $\beta_2$, concluding that zombie firms in sectors more exposed to exit barriers are more likely to exit after the reforms that reduced those barriers.

Effective insolvency regimes should not only potentiate the exit of non-viable firms but also the restructuring of the most productive zombies, where it is feasible. With an alternative specification focusing solely on zombie firms and taking into account their productivity levels, we provide evidence that this second channel is also present.

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41 Firm controls include age, number of workers, firm turnover growth and relative labor productivity vis-à-vis the sectorial-year average. Two digits sectorial-year fixed effects are included and robust standard errors are clustered at the sectorial-year level.

## 3.   Final remarks

Zombie prevalence has been curbing the growth of viable firms in Portugal. Accordingly, fostering the exit of the least productive firms is certainly appealing, but one needs to carefully consider the broad implications. In Portugal, zombies are responsible for a significant part of employment: in some sectors, more than 1 out of 5 workers are employed in a zombie firm; and, in some regions, the figure increases to 1 out of 3. Thus, looking ahead, the policy mix must be carefully designed to address the important social costs that may arise. The same concern holds for capital: in some industries, more than 25% of tangible capital is allocated to zombies. As they exit the market, part of this capital will be lost, as it is firm-specific.

On improving the allocation of capital, there are important complementarities between bank health and good insolvency regimes. The latter reduce incentives for evergreening and bank forbearance, by encouraging a timely start of insolvency processes and promoting effective firm resolution. It should be emphasized that zombies are, on average, larger than non-zombies, with more assets to pledge as collateral. If banks' financing criteria focus on the existence of collateral, rather than on the quality of the project or of the firm, zombie lending lasts even without evergreening motives. This calls for further policy action, in particular as the intangibles - non-collateralizable - gain importance in the economy. Public policy may be key in correcting information asymmetries in the bank financing market, for instance via well-designed public guarantees systems, and in fostering the development of alternative financing options - in particular in the context of supranational initiatives, such as the Capital Markets Union in the European Union.

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