The share of zombie firms among Austrian nonfinancial companies

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Aggregate productivity and economic growth may be reduced by "zombie firms" – weakly performing companies that, instead of exiting the market or being restructured, manage to continue operating over an extended period. This article presents first results on the incidence of such zombie firms in Austria, based on three definitions relating to firms' interest expenses but focusing on different aspects thereof. The main definition measures interest expenses as a ratio of earnings ("interest coverage ratio"). The other two definitions are based on the relationship of interest expenses to liabilities and enhance this information either with firms' probability of default or their interest coverage ratio. According to all three definitions, the share of zombies fell substantially (even if to different degrees) between 2009 and 2018, across industries and firm sizes. The drop of the zombie share was particularly strong for highly leveraged enterprises. Still, at the end of our observation period, zombie firms continued to have less favorable risk characteristics than non-zombie firms, in particular a distinctly higher probability of default. How this pattern may have changed as a result of the COVID-19 pandemic remains to be seen because our data do not go beyond 2018. Somewhat reassuringly, zombie firms are not more prevalent in those industries that were hit particularly hard by the pandemic. Further findings were obtained with simulations keeping the policy interest rate unchanged over the period under review. Under this assumption, the zombie share established with firms' interest coverage ratio would have remained roughly constant. The difference between the observed and the simulated zombie shares is particularly pronounced for real estate-related industries, more leveraged firms, and larger companies. Finally, the data show that zombie status is not irreversible. Among those firms for which financial statements information is available for the entire observation period, most zombie firms manage to exit from zombie status.

In a competitive market, weakly performing companies would exit the market, be taken over or restructure. And yet, some firms manage to continue operating over an extended period despite their weak performance – as did Japanese firms after the collapse of the Japanese asset price bubble in the early 1990s, supported by the banking sector. It is in this historical context that the label "zombie firms" was first applied.

The economic literature has since identified several ways through which zombie firms can reduce aggregate productivity and economic growth. For one, zombie firms themselves are often found to exhibit low levels of productivity.[2] Additionally, the literature has pointed to "congestion" effects caused by zombie firms. Congestion effects may occur if zombie firms lock resources and thereby crowd out investment

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and growth of more productive firms or if the presence of zombie firms impairs the availability of loans to healthy firms.[3] The latter may occur either directly – given the inability of banks to lend to healthy firms because their balance sheets have been weakened by their zombie exposure – or because zombie congestion has reduced industry profitability and thus the returns on potential projects of healthy firms. Furthermore, it has been argued that zombies add to pressures that healthy non-zombie firms are facing if they want to obtain bank financing. By "absorbing" bank capital at prices below a level that might be adequate with respect to their riskiness they might drive up interest rates on bank loans for non-zombie firms or even reduce access to external financing (see Hallak et al., 2018). Moreover, any financial "subsidies" that zombie firms receive from banks in the form of loans at interest rates that do not reflect their credit rating, allows them to exert competitive pressure on healthy firms on product and factor markets for longer periods than would have otherwise been feasible. However, the notion of zombie firms "congesting" loan markets implies that other firms would stand ready to borrow the very funds that were locked up at zombies. Yet, at least until the onset of the COVID-19 pandemic, relevant surveys such as the WIFO business cycle survey or the ECB's Survey on the Access to Finance showed a decreasing share of enterprises reporting impaired access to bank loans. Furthermore, start-ups are by their very nature not apt for financing in the form of bank loans.[4]

Even if zombies were a drag on productivity growth and hindered the reallocation of labor to more productive uses, in the current situation their existence can be of some benefit as they contribute to employment. Eventually, such companies might fail, but in the current adverse economic circumstances, there is no benefit in forcing them all out of business at once.

In the past decade, monetary policy might have contributed to the emergence of zombie firms in several ways: As low interest rates reduce banks' opportunity costs of cleaning up their balance sheets (the return on alternative assets), cut the funding cost of bad loans, and increase the recovery rate on those loans, banks are more likely to "evergreen" loans to zombie firms. Furthermore, a lower interest rate level may increase banks' incentives for risk-taking (Borio and Zhu, 2012). Since zombie companies are risky debtors, more risk appetite should reduce financial pressure on them (Banerjee and Hofmann, 2018).[5] Acharya et al. (2019) find that the ECB's OMT announcement in 2012 induced banks to extend credit to low-quality borrowers at subsidized rates in euro area periphery countries. In contrast, more stringent regulatory requirements or changes in banks' risk policies might have curbed bank lending to potential zombies, therefore negatively affecting the zombie share (see Gnan et al., 2019).

The COVID-19 pandemic has added fresh impetus to the discussion over zombie firms. With an uncertain economic outlook, the survival chances of firms

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[3] *See for example Banerjee and Hofmann (2018) and Adalet McGowan et al. (2017) for the former and Andrews and Petroulakis (2019) for the latter.*

[4] *See Berger and Udell (1998) who postulate a life-cycle theory of small firm finance wherein financial needs and options change as the business grows and becomes less informationally opaque. Likewise, Hall (2009) finds evidence that debt is a disfavored source of finance for R&D investment. See also Bindseil and Schaaf (2020) in the context of zombie firms.*

[5] *Evergreening of loans to zombie firms might also arise because of bank forbearance, as banks might want to avoid realizing losses on their balance sheets.*

in general and of less productive firms in particular have become more uncertain. At the same time, one might argue that massive government interventions in reaction to the pandemic may allow firms to survive that under normal circumstances would exit because of poor performance. Thus, government measures may have created zombies, even if these measures are intended only for firms that were economically viable before the crisis. This could hold back the economic recovery. Moreover, since bank loans have been a central instrument to safeguard corporate liquidity during the pandemic as monetary, fiscal and prudential policies all aimed to uphold the flow of bank lending to the real economy, the support measures will increase the debt of corporations and the number of debt-laden companies which in turn could create additional zombie firms.

Against this background, we take stock of the incidence of zombie firms in Austria, based on a number of firm characteristics, such as size and age, risk characteristics, and industry affiliation. The evidence we provide is, among other things, derived from an OeNB firm database containing annual financial statements information and it relates to the period 2009 to 2018. This implies that our dataset does not include the time since the onset of the COVID-19 pandemic.

This paper is structured as follows: Section 1 describes the dataset. In section 2, we discuss the definition of zombies, particularly in terms of operationalization for our analysis. Section 3 presents our results. We show both the development of zombie firms over time as well as the characteristics of zombie firms for the latest year available. By means of simulation we also discuss how the share of zombie firms would have – ceteris paribus – developed if interest rates had remained unchanged over the period under review. Finally, section 4 concludes and discusses potential caveats.

1 Data

The dataset employed in our analysis is drawn from several data sources. First, we make use of annual financial statements information about nonfinancial corporations domiciled in Austria that the OeNB compiles for the purpose of inhouse credit assessment (ICAS) ratings. These ratings serve to assess the eligibility of credit claims as collateral for Austrian banks' monetary policy operations with the OeNB. As the OeNB accepts only credit claims to firms with a sufficiently high creditworthiness for this purpose, more stable companies are likely to be overrepresented in our sample. Yet, credit claims of a large part of the firms in the sample are not eligible for Eurosystem monetary policy operations. An essential part of the financial statements information is drawn from Austria's public commercial register ("Firmenbuch"). This implies that the granularity of the data is quite heterogeneous, since reporting requirements are much lighter for smaller firms. Therefore, the OeNB additionally collects more granular financial statements information provided by banks and the firms themselves. For the purpose of this paper, we augment the financial statements data with information on the one-year probability of default (PD) for the respective firm-years, as calibrated in the ICAS framework. In those cases where an ICAS-PD is not available we use PD measures derived from IRB ratings of credit institutions. Furthermore, we supplement these data with information on the sector classification and founding date of the companies, which is also available at the OeNB.

We exclude firm-years whose financial statements are not granular enough to calculate the indicators relevant for our analysis. This concerns notably small firms, which therefore are underrepresented in our sample. Records which fail basic data quality checks are also excluded from the sample. Furthermore, we include only nonfinancial corporations (i.e. sector 11) according to the European System of Accounts (ESA). Given the distinct scope of their activity, we omit head offices (NACE group 70.1) and holding companies (NACE group 64.2) based on the Statistical Classification of Economic Activities in the European Community (NACE).[6] Thus, an unbalanced panel containing 70,113 firm-years for the years 2008 through 2018 is available for our analysis. The annual number of companies in our dataset falls over most of the observation period. Starting with 6,792 observations in 2008, the annual number of observations peaked at 8,337 in 2011 and dropped to 3,120 in 2018. This drop is due to an increasing focus of the ICAS data on firms whose assets are more likely to be pledged as collateral for monetary policy operations.

2 Three definitions to identify zombie firms

Our starting point is the specification that has been most commonly employed in the recent empirical literature (e.g. Adalet Mc Gowan et al., 2017; Banerjee and Hofmann, 2018; Andrews and Petroulakis, 2019; Deutsche Bundesbank, 2017), namely the ratio of operating income (using EBIT[7]) to interest expenses. Essentially, the interest coverage ratio (ICR) measures how many times a company can cover its current interest payments with its operating income. The lower a firm's ICR, the larger the fraction of annual operating income it has to use for interest payments. A company with an ICR of 1 will spend its entire operating income on interest payments, while a company with an ICR of below 1 – which is our first definition of zombie firms – will not generate enough operating income to meet its current interest payment obligations. In addition to their low internal financing capacity, firms with a low ICR might face external financing constraints and thus investment constraints. It has been shown that companies with a high interest rate burden (implying a low ICR) have lower investment rates because debt servicing has a strong influence on investment activity (Martinez-Carrascal and Ferrando, 2008).[8]

In order to smooth short-term fluctuations, we assume that the ICR must have been smaller than 1 for two consecutive years in order for a firm to qualify as a zombie firm. In doing so, we follow the practice in the relevant literature, although most of the papers use a period of three years. However, because of frequent exits from and entries to the dataset, a three-year period would have excluded 55% of the available firm-years from the dataset for calculating the zombie indicator, instead of 35% when using two years. As a further criterion, also following the

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[6] *Those firms own and control other economic entities within a company group. Head offices oversee and manage these units, while holding companies' principal activity is owning the group, without administering or managing it. Typically, such entities do not produce or sell any products or services or conduct any other business operations. Given the scope of their activities, the structure of their balance sheets and their profit and loss statements differs from other firms. In 2018, a little over 5% of all firms in the dataset were head offices and holding companies.*

[7] *There is some discussion about which metric of the operating income is the most fitting in this respect. See annex A4.*

[8] *Very high ICRs might, however, also indicate that opportunities for borrowing and thus for future growth are not being used.*

literature, we presuppose a minimum enterprise age of ten years in order to prevent falsely classifying young fast-growing enterprises whose profits are still low as zombie companies.[9]

This definition of zombie firms is based on the idea that weakly performing firms are not able to cover their interest expenses with their earnings. However, this definition may also classify some firms as zombies that e.g. have negative profits for a number of years while developing a new product that may later generate profits. Another aspect is the relationship between the ICR and the interest rate environment. Falling interest rates, as observed in the last decade, entail lower interest payments by companies. Thus, by construction of this indicator, it is expected that – ceteris paribus – the share of firms identified as zombies decreases as well, although the fundamentals of the weakly performing firms might remain unaltered.

Alternatively, we identify those companies as zombies that pay lower interest rates on their outstanding debt than would be warranted by their credit rating or their ICR, respectively. This approach has been pioneered by the seminal work of Caballero et al. (2008).[10] We operationalize this definition by following the approach presented by Acharya et al. (2019) for our second and Acharya et al. (2020) for our third definition (see below). For both approaches, the initial step is to identify firms that pay an interest rate on outstanding debt that is below a benchmark interest rate – termed preferential interest rates (PIR) in the following. A company's interest rate in this context is defined as the ratio of its interest expenses according to the profit and loss statement to its liabilities according to its balance sheet. The benchmark interest rate is calculated as the median interest rate paid on outstanding debt of firms with a very good credit rating. Using the harmonized rating scale of the Eurosystem, firms with a very good credit rating are those companies who qualify for the credit quality steps (CQS) 1 and 2 on this rating scale – i.e. companies with a default probability below 0.1%. In other words, the amount of interest paid by a company plays a role both when we use the ICR measure and when we use the PIR measure. However, the effects of a change in interest rates are different. Ceteris paribus, rising interest payments increase the likelihood that the interest coverage ratio drops below 1 (i.e. our first definition of zombie firms) but decrease the likelihood that paid interest exceeds the benchmark interest rate.

In our second definition, we assume that zombie firms are firms that meet the preferential interest rate criterion and also have a low credit rating, and have been in the market for at least ten years. Specifically, the credit rating criterion is met if the firm's probability of default is above 1%, which means that the firm is not eligible for additional credit claims[11] (ACC) according to ICAS. As this definition comprises both access to preferential interest rates and a default probability measure, we call this measure PIR-PD. Credit institutions might agree to such preferential interest rates for companies with a bad credit rating out of concerns that these firms would face further distress and might end up in bankruptcy. Such firms

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[9] It could be argued that applying this criterion leads to the omission of all those firms that exit the market before becoming ten years old. But the aim of this analysis is not to look at unviable firms but on those unviable firms that do not leave the market.

[10] Caballero et al. (2008) label this definition as "subsidized credit."

[11] The upper level for ACC is set at 1.5% for the Eurosystem in general but modified to 1% for the Austrian ICAS.

are not identified by the ICR definition as zombies despite their weak economic performance because of their low interest payments. The PIR-PD definition addresses this issue and identifies any firms as zombies whose loan conditions are unusually favorable in the context of their credit ratings. This definition, therefore, relaxes the assumption that on competitive financial markets corporations pay interest rates on their outstanding debt based on their risk profile. A drawback of this definition is the implied link between the probability of default and interest payments. Although this link is very well established in the academic literature (Schierenbeck, 2014), any circumstance that decreases the interest payments as a proxy for expected credit losses while not affecting the rating, such as implicit support (by public entities) or collateral, might lead to incorrectly classified corporations.

Our third definition, finally, combines the ICR criterion and the PIR criterion. Specifically, we assume that zombie firms are companies older than ten years that have an ICR below 1 and pay preferential interest rates. Accordingly, we call this measure PIR-ICR.

A caveat regarding the use of interest rates that applies to all definitions is that relating a flow variable covering a whole year (interest expenses) to a year-end stock variable (outstanding debt) might create some inconsistencies. For example, interest expenses are overestimated in those cases where a firm reduces or pays off its loans before the end of the year so that they are no longer recorded on the balance sheet. Conversely, the opposite effect might occur if a firm takes out a loan late in the year. Similarly, loans that a firm receives from another group member might have different conditions than bank loans.

3 Results

In this section, we present our results based on the zombie definitions presented above. Following a discussion of the overall trend over time using all three definitions, we analyze the results for the ICR definition in more detail.[12] As the ICR definition includes only cases with an ICR below 1 for two consecutive years, the first year for which zombie firms can be identified by this measure is 2009. The percentage of zombie firms for any given year is calculated as the number of zombie firms in that year divided by the total number of firms in the same year which can be either identified as zombie or non-zombie firms (excluding nonclassifiable firms).

3.1 Development of the zombie share from 2009 to 2018

For 2009, the ICR measure identified 10.6% of the firms in our sample as zombie firms against 13.2% according to the PIR-PD metric and 6.0% according to the PIR-ICR indicator. Until 2018, the share of zombies in our sample fell strongly based on all three measures: by 6.5 percentage points to 4.1% based on the ICR indicator, by 11 percentage points to 2.2% based on the PIR-PD indicator and by 5 percentage points to 0.9% based on the PIR-ICR indicator.[13] Even though the zombie share declined for all three measures, the shape of the decline differed. While the zombie share according to the ICR remained relatively stable in the first four years — and even increased by 0.8 percentage points in 2011 — it declined noticeably

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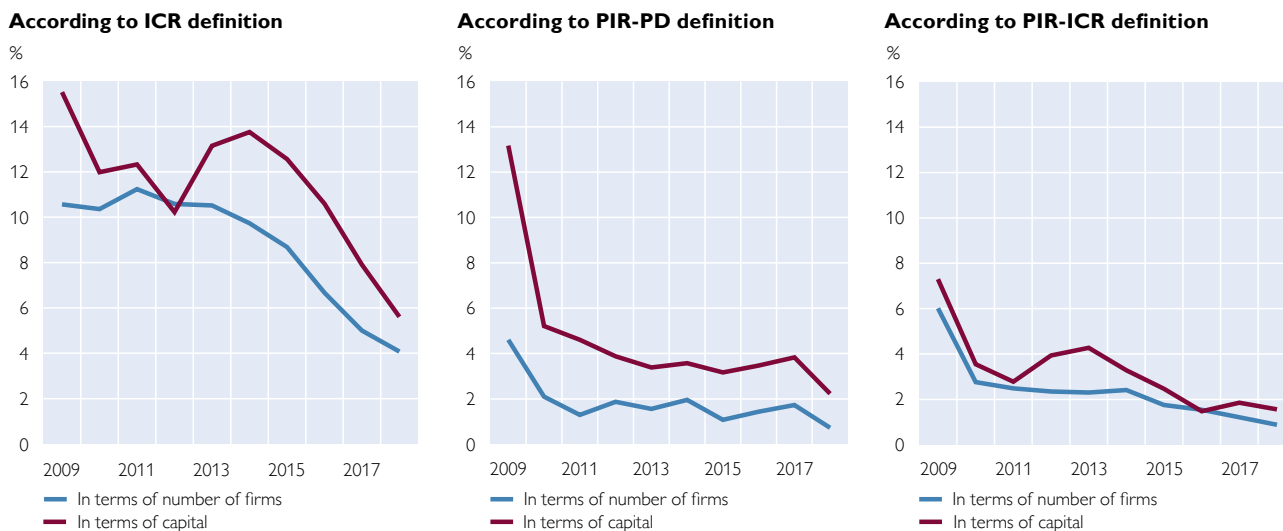[12] See the appendix for detailed results for the PIR-PD and the PIR-ICR indicators.

[13] Using three instead of two years, the zombie share according to the ICR measure would have been 2.6% in 2018 instead of 4.1%.

in the second half of the observation period. This reduction was especially pronounced in the years 2015 to 2017, when the share of zombie firms fell by more than 1 percentage point each. In contrast, the zombie shares according to the definitions including preferential interest rates exhibit stronger initial declines.

In order to gauge the economic weight of zombie firms for the Austrian nonfinancial corporate sector, not only their incidence in terms of the number of companies is of relevance but also the resources they capture. Based on the balance sheet totals of the firms in our sample, which represent the total capital – both in the form of debt and equity – invested in a company, the share of the capital stock absorbed by zombie firms also fell in the period under review for all definitions. In the case of the ICR, the capital-weighted zombie share fell from 15.6% to 5.6%. In most years, this share was slightly higher than that resulting from the number of firms, implying that the average zombie firm according to the ICR metric is larger than the average non-zombie company. Yet, for both the number of firms and the capital employed the ICR-based zombie share shrank by roughly 60% between 2009 and 2018. Similar to the zombie share in the number of firms, the reduction of the capital zombie share was especially pronounced toward the end of our observation period, namely from 2015 onwards. In the first half of the period under review, the development showed a different pattern than the zombie share in the number of firms, with marked decreases in 2010 and – to a lesser extent – in 2012 and a strong increase in 2013. While based on the ICR, the zombie share using the capital invested was higher than the share in the number of firms; this relationship was inverse in the case of the two definitions that include preferential interest rate payments. Starting from 4.6% in 2009, the zombie share shrank to 0.7% at the end of the observation period according to the PIR-PD measure and from 7.3% to 1.6% according to the PIR-ICR measure.

To some degree, the decrease in the prevalence of zombie firms in the period under review reflected cyclical developments. After a strong reduction in 2009 in the wake of the Great Financial Crisis, the Austrian GDP recovered subsequently, in particular toward the end of the period under review. Moreover, our observation period covers a period of falling interest rates, driven by the Eurosystem's accommodating monetary policy. With the ICR serving as a yardstick, falling interest rates mechanically contribute to a reduction of the number of zombie firms. All else equal, lower interest rates improve ICRs by reducing interest expenses. The relief was all the stronger as a large part of corporate debt in Austria, in particular bank loans, carries a variable rate, mostly tied to short-term rates, which reduces the interest burden swiftly when interest rates fall.[14] Moreover, low interest rates and the accommodating monetary policy in general might have buoyed the economic environment at large and hence corporate profitability, which in turn increased the denominator of the ICR measure. Finally, it is worth mentioning that this development was not confined to Austria. The fall in the zombie share since the Great Financial Crisis in Austria as reported in this study is consistent with falling zombie shares in other euro area countries as reported in Banerjee and Hofmann (2020).

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[14] In 2009, more than 96% of bank loans to nonfinancial corporations had an interest rate fixation period of up to one year; until 2018, this share fell to 84%, according to BSI data.

Chart 1

Share of zombie firms in Austria (2009–2018)

According to ICR definition	According to PIR-PD definition	According to PIR-ICR definition

Source: OeNB, authors' calculations.

3.2 Zombie share by firm characteristics according to the ICR definition
3.2.1 Development of the zombie share from 2009 to 2018

In this section, we explore the development of the share of zombie firms in our sample in greater detail, using the definition that is based on the ICR. For an industry breakdown, we cluster the firms in our sample into four groups, based on the first hierarchical NACE level of the section to which they belong:[15] first, manufacturing, which is equivalent to NACE code C; second, "distributive industries," including trade (NACE G), transportation (NACE H) and accommodation (NACE I); third, real estate-related industries, comprising construction (NACE F) and real estate-related activities (NACE L); and fourth, the category "others" as a residual covering all other industries. Chart 2 (upper left-hand panel) shows that while the zombie share decreased for all industries, there was large heterogeneity as to the degree of this decrease. Over the whole observation period, the reduction was most pronounced for the distributive industries (–9.3 percentage points). For the other industries, the drop of the zombie share was below the value for the whole sample. In the case of the real estate-related industries, the reduction in the share of zombie firms amounted to 6.3 percentage points, and their zombie share surpassed the total zombie share from 2016 onward. The reduction of the zombie share in manufacturing amounted to 5.8 percentage points.

The upper right-hand panel of chart 2 reports the evolution of the zombie shares by firm size. For classification by size, we refer to the standard classification by the European Commission (2003), but due to data limitations, we can classify

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[15] As the number of enterprises in our database is relatively low, there are very few companies in some industries according to NACE. Therefore, it is not meaningful to compute zombie shares for each of the 21 NACE level 1 sections. See annex for details on the industry reclassification.

companies solely according to their total assets.[16] Over the whole period under study, small firms displayed a lower zombie share than both medium-sized and large companies. While the zombie share fell in all three size classes, the reduction was more pronounced for small firms. In the case of the large firms, the zombie share declined from 11.6% in 2009 to 7.0% in 2018, and for small firms from 9.0% to 2.4%. Thus, the difference between the zombie shares of large and small enterprises even increased over much of the observation period, standing at 4.6 percentage points at the end of the observation period.
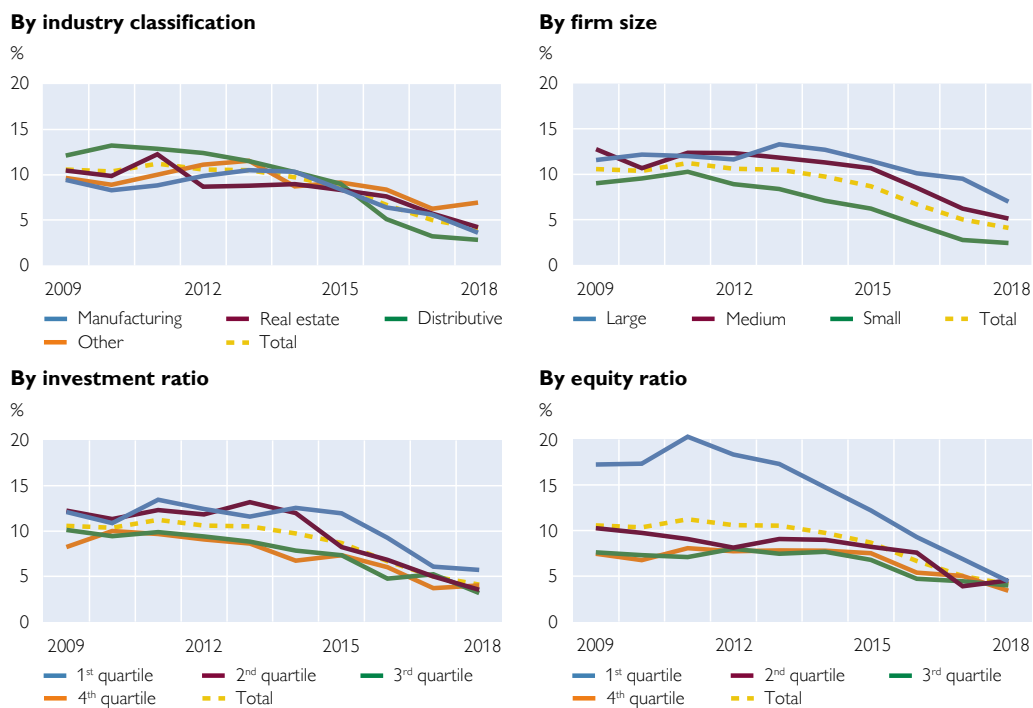
Additionally, the two lower panels of chart 2 look at two firm characteristics that are referred to in the literature as being related to the occurrence of zombie firms: the investment ratio and the leverage of the firms, expressed by the equity ratio. For this, we classify the zombie firms into four groups for each year. In both cases, the first quartile contains the firms with the smallest values of the respective attribute and the fourth quartile the largest ones.

In the lower left-hand panel, we look at the investment ratio, defined as investments divided by the balance sheet total. As pointed out above (in section 2), financially weak firms generally find it harder to invest. In this vein, the literature has pointed out that zombie firms invest less (e.g., Banerjee and Hofmann, 2020; or Storz et al., 2017, who include negative investment into their zombie definition). Over most of the period under review, the two higher quartiles – containing the firms with higher investment ratios – exhibited lower zombie shares than the lower ones. Especially towards the end of the observation period, the firms in the bottom quartile of the distribution, which contains the firms with the lowest investment ratio, had a distinctively higher zombie share. This finding would vindicate the findings in the papers referred to above that zombie firms invest less.

The bottom right-hand panel shows the zombie shares by equity ratio quartiles. Companies with a high equity ratio have to remunerate a smaller share of the capital that they employ in the form of interest. Thus, they pay less interest out of their income than those with a lower equity ratio. Given that the remuneration of debt (i.e., interest expenses) is included in the numerator of the ICR, but the remuneration of equity is not, a negative relationship between zombie share and equity ratio can be expected. And indeed, over most of the observation period, the firms in the quartile with the lowest equity ratios (i.e., the most leveraged companies) had a considerably higher zombie share. Until 2013, the difference in the zombie share between the firms in the lowest and the highest quartile was close to or even more than 10 percentage points. In the following years, the difference shrank rapidly, and in 2018, the difference was just 1 percentage point. Over the whole period under study, the zombie share of the firms in the quartile with the lowest equity ratios fell by 12.8 percentage points, compared to a reduction by 4.1 percentage points among the firms in the quartile with the highest equity ratios. The fact that the difference between the zombie share in the first quartile and the other quartiles is so much bigger than the differences among the other three quartiles suggests that the relationship between leverage and zombie status is not linear. To a large extent, this might reflect the construction of the ICR measure: the amount

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[16] *Accordingly, small companies have a balance sheet total of up to EUR 10 million, medium-sized companies of between EUR 10 million and EUR 43 million, and companies with total assets of more than EUR 43 million are classified as large companies. European Commission (2003) also uses staff headcount and turnover for the classification.*

Chart 2

Zombie share in Austria by firm characteristics – ICR definition

By industry classification

%

Manufacturing — Real estate — Distributive
Other — Total

By firm size

%

Large — Medium — Small — Total

By investment ratio

%

1st quartile — 2nd quartile — 3rd quartile
4th quartile — Total

By equity ratio

%

1st quartile — 2nd quartile — 3rd quartile
4th quartile — Total

Source: OeNB, authors' calculations.

by which income exceeds interest expenses for a company to qualify as a non-zombie is irrelevant. Lower interest rates reduce the amount of interest due on the outstanding debt and thus make it easier to pay those interest expenses out of income. This is especially relevant for companies with a relatively high debt share (and consequently a lower equity share) in the capital structure.

3.2.2 Comparing zombie and non-zombie firms in 2018

Table 1 compares zombie firms and non-zombie firms in our dataset in 2018, the most recent year of our dataset. On average, zombie firms are larger and older than non-zombie firms. Reflecting the high shares of zombie firms among large enterprises over most of the period covered by our sample, the median balance sheet total of the zombie firms was almost three times as large as that of non-zombie firms. Perhaps somewhat related to the differences in firm size, the median zombie firm is about four years older than the corresponding non-zombie, though according to our definition only firms that are ten years and older are classified as zombies, whereas non-zombies include firms that have ICRs higher than 1 for two years but are younger than ten years. Our results are in line with other papers (e.g. Adalat McGowen et al., 2017; Hallak et al., 2018; Schwartz et al., 2018) that find that the share of zombie firms is positively correlated with size and age. These patterns could result from the fact that larger and older firms are less opaque (see Hallak et al., 2018 as well as Beer and Waschiczek, 2019) and are more likely to have established longer-term lending relationships with banks, which might justify financing them from the viewpoint of the bank despite their poor economic performance. Moreover, the sunk costs of loan restructuring and the potential need for additional

Table 1

Comparing zombie and non-zombie firms according to ICR – 2018

		Zombies		Non-zombies	
		Mean	Median	Mean	Median
Characteristics of zombie and non-zombie firms					
Balance sheet total	EUR million	72.0	24.8	51.5	8.8
Age	Years	27.3	22.0	24.4	18.0
Equity ratio	%	33.9	34.2	37.4	36.8
Probability of default	%	1.1	0.7	0.7	0.4
Investment ratio	%	8.8	3.5	9.1	4.9
Industry affiliation of zombie and non-zombie firms					
Manufacturing	%	18.5		20.0	
Real estate-related industries	%	36.1		34.9	
Distributive industries	%	20.4		30.2	
Other	%	25.0		14.9	
Total	%	100.0		100.0	

Source: OeNB, authors' calculations.

capital tend to be higher for large firms. On a positive note, it could be argued that larger firms tend to be more diversified, which reduces their probability of bankruptcy, so that they can afford higher levels of borrowing, even though this increases their interest service burden.

Overall, zombie firms have less favorable risk characteristics than non-zombie firms. First, they have a slightly lower equity ratio than non-zombies (34.2% against 36.8%). Second, zombie firms were found to have a markedly higher PD: At 0.7%, the PD of zombie firms was more than one and a half times as much as the value recorded for non-zombie firms. At the same time, the average zombie firm invested less; at 3.5% of the balance sheet total, their investments were about 30% lower than those of a non-zombie.

Regarding the industry structure, the shares of manufacturing and real estate-related industries are similar for zombie and non-zombie firms. However, in the distributive industries, the share of zombie firms is 10 percentage points lower than is the case of non-zombies. The high share in others (25.0%) was mainly due to financial services (NACE K, without holding companies), arts, entertainment and recreation (R) and other service activities (S). Additionally, we broke down the industries by the degree to which they have been affected by COVID-19, based on an estimation of the impact of the pandemic on the individual industries with a corporate insolvency model developed by Puhr and Schneider (2021).[17] It turns out that the group of industries that this model has identified as being most severely hit by COVID-19 had roughly the same share of zombie firms as the least affected group, with a lower zombie share for the group in the middle. Thus, notwithstanding some exceptions, zombie firms were not more prevalent in those industries that were eventually hit particularly hard by the pandemic.[18]

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[17] *The affectedness by the pandemic was estimated as a reduction in output in 2020 compared in 2019.*

[18] *In 2018, the zombie share of the group of industries most affected by the pandemic (which included NACE codes R, I, N, B, S, H) was 5.2%, that of the group in the middle (C, G, M, A, F, P) was 3.0% and that of the least affected group (J, Q, E, L, K, D) amounted to 5.0%.*

3.2.3 Tracking the ICR in the period from 2009 to 2018

In this subsection, we aim to shed more light on the development of the relation between interest expenses and EBIT, since the ICR definition for zombie-firms is, as described above, only a binary classifier based on a threshold value (EBIT/interest expenses < 1). To this end, we analyze the 468 firms of our sample for which financial statements information is available for each year of the observation period and which were older than ten years at the start of the observation period. For this subsample, the share of firms identified by the ICR indicator as zombies follows a similar pattern compared to the full sample. In 2009, 10.6% (the same percentage as for the full sample) of the firms were identified as ICR zombies. This ratio dropped to 3.6% (full sample: 4.1%) in 2018.

We divide the firms in the subsample into five categories based on their ICR, where category 1 contains the firms with the highest and category 5 the firms with the lowest ICR. Category 5 contains all firms with an ICR below 1, such that any firm which stays in this category for two consecutive years is identified as a zombie by the ICR definition. The other firms are grouped into categories 1 to 4 so that each category contains approximately the same number of firms in the first year. Chart 3 displays the evolution of the ICR categories, whereas the height of the nodes represents the number of firms in the respective year/category, and the lines connecting the nodes represent the transition between the categories. As can be seen, most firms in the lower categories migrate to the higher categories over time. Indeed, the share of firms classified in category 5 decreased from approximately 20% in 2009 to 7% at the end of the observation period. In contrast, the number of firms in category 1 more than doubled. In 2018, about 45% of the firms in the sample were assigned to this category. The increase by 7 percentage points

Chart 3

Tracking Austrian firms' interest coverage ratio
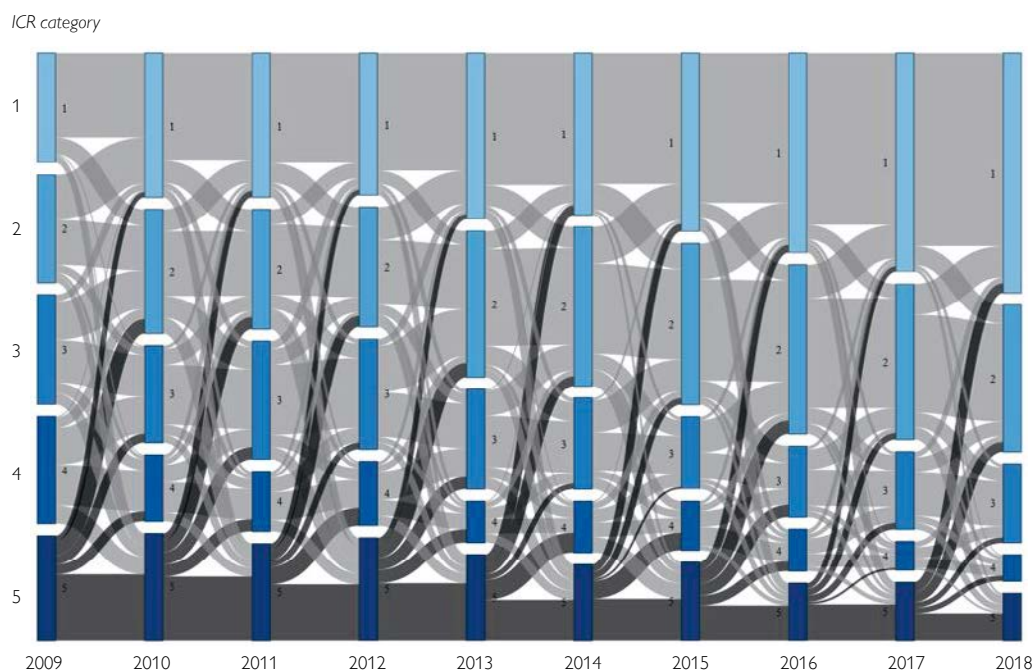
ICR category

Source: OeNB, authors' calculations.

in the share of firms classified to category 2 is less prominent but still substantial. Thus, it can be said – for those firms that are in the sample for the whole period – that most companies manage to exit from zombie status for a more advantageous category. This finding is in line with the findings of other studies, for example Banerjee and Hofmann (2020) who look at 14 OECD countries and find that about 60% of zombie firms recover, although they remain weaker and more fragile than firms that have never been zombies.

3.2.4 Simulation exercise: gauging the effect of falling interest rates

As pointed out above, the fall in the interest rate over the period under review mechanically reduced the interest burden of existing firms taken their outstanding debt as given, especially in an environment of variable interest rates, and consequently the probability of becoming a zombie firm according to the ICR definition. In order to gauge the effect of the reduction in interest rates, we calculate how the zombie share would have evolved if the interest rate had remained stable over the whole period, assuming that all firm characteristics apart from interest expenses remain unchanged.

To calculate the simulated interest rates, we first define interest rate markups for each year as the difference between the 2009 annual average of the 3-month EURIBOR (=1.223%) and the actual 3-month EURIBOR at the end of the year – if this difference is positive. Otherwise, i.e. if the 3-month EURIBOR in a particular year was higher than the 2009 average rate, the markup is set to 0.[19] We use the 3-month EURIBOR because it is a widely used reference rate for variable rate bank loans. To obtain simulated interest rates for each firm-year, we then add this interest rate markup to the interest rates paid by a firm on its outstanding debt (ratio of interest expenses to its total liabilities). The simulated interest rate is the hypothetical interest rate that a firm would have to pay if the 3-month EURIBOR had remained at the 2009-average level. Hence, the simulated interest rate takes into account the actual evolution of the spreads between loan interest rates and the reference rate. Finally, we calculate simulated interest rate payments by multiplying a firm's liabilities by the simulated interest rate. As in the original ICR definition, zombie firms are identified as firms for which the simulated interest rate payments are higher than EBIT for two consecutive years and their age is ten years or higher.

Chart 4 shows how the share of zombie firms based on the ICR definition would have developed if short-term interest rates had remained at the 2009 level. Until 2011, the simulated share of zombie firms in our sample trails the observed ICR share. In the following years, the effect of the lower interest rate on the zombie share became apparent as the simulated zombie share rose to close to 15% (in 2013). Thereafter, the difference to the observed ICR zombie share continued to rise until 2015. In the last three years of the period under review, in which the short-term interest rate no longer decreased, the difference between the two shares remained more or less stable as the simulated zombie share followed the downward movement of the observed zombie share based on the ICR criterion but remained 4 percentage points higher than the observed ICR share.[20]

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[19] This was the case in 2011.

[20] The development was similar when using balance sheet totals instead of the number of firms: In the years until 2015, the simulated zombie share rose more than 20%. Until that year, the difference to the "actual" ICR zombie share likewise increased and remained more or less stable (at around 8 percentage points) thereafter.

Chart 4

Zombie share in Austria according to ICR definition: observed and simulated

% and percentage points

%
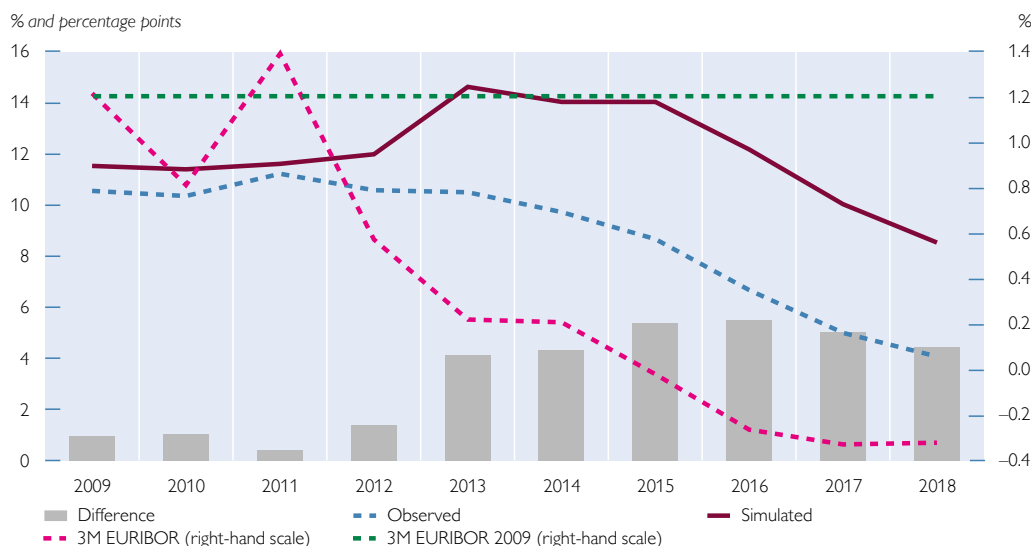
Source: OeNB, ECB, authors' calculations.

In order to analyze which type of enterprises were spared acquiring zombie status by the fall in the interest rates in the period under review, we employ the same classification of zombie firms by firm characteristics and industry affiliation as in subsection 3.2 above. Chart 5 represents the difference between the simulated zombie share and the one according to the observed ICR metric. In the top panel of chart 5, which shows these differences by industry affiliation, the strong increase in the gap between the simulated zombie share and the one based on the observed ICR in the case of the real estate-related industries in the years 2011 to 2015 stands out. In that hypothetical scenario, 16.5% of all firms in our sample affiliated to real estate-related industries would have been zombies in 2015, twice the share according to the observed ICR. In the following years, this difference remained high. This suggests that these industries not only benefited from the strong increase in property prices in the period under review – which some observers have linked to the low interest environment – but that the low interest rates also supported the viability of their business model more directly.[21] Firms belonging to other industries also avoided becoming a zombie thanks to the falling interest rates level, but to a considerably lesser degree. The differences between the simulated and the observed ICR zombie shares of manufacturing as well as the distributive industries also increased (in particular from 2011 to 2015), but less than the difference for the entire population of firms in our sample. Over the whole observation period, the difference between the simulated zombie share and the one based on the observed ICR amounted to 5.8 percentage points in the case of the real estate-related industries, compared to 2.6 percentage points for the distributive industries and 1.2 percentage points in manufacturing.

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[21] *The business model of real estate-related industries depends more than that of other industries on bank loans. Their bank loan intensity, defined as the ratio of bank loans to gross value added, is distinctively higher than in other industries (see Waschiczek, 2018). However, if the central bank raises the interest rate level, a number of firms in the real estate-related industry might be seriously impaired.*

Broken down by firm size, the gap between the simulated and the observed ICR share widened much more for the large and medium-sized firms than in the case of small firms. While the differences remained low in the first three years of our observation period, they increased in 2012 and 2013 for all size groups. Already in these two years, the gaps increased to a larger extent for the large and medium-sized firms. From 2014 onwards, the difference between simulated and observed ICR zombie shares continued to widen considerably for the large and medium-sized firms while remaining more or less stable for the small firms. Thus, it was primarily larger and medium-sized companies that were spared becoming a zombie firm.

As to the investment ratio, the differences between simulated and observed ICR shares did not differ considerably. The zombie share would have increased somewhat stronger for the first quartile than for the other quartiles, especially toward the end of the observation period. This would imply that firms with comparatively little capital expenditures would have been somewhat more likely to turn into a zombie if interest rates had remained at their 2009 level.

Regarding the equity ratio, among the firms in the first quartile the zombie share would have fallen far less under a constant interest rate level. This is the quartile for which the ICR indicates the highest zombie share by far for most of the observation period. The zombie share of the quartile with the most leveraged firms would have risen to 25% until 2013, and although the difference to the observed ICR zombie share of that quartile fell by more than 10 percentage points in the following five years, the zombie share would have been 10.3 percentage points higher by the end of the period under review under the assumption of a stable interest level. For firms from the other quartiles, the effect of unchanged interest rates would have been much slighter.

Chart 5

Difference between observed and simulated zombie shares for Austria
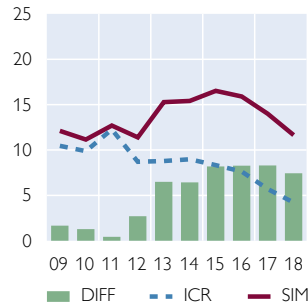
By industry affiliation
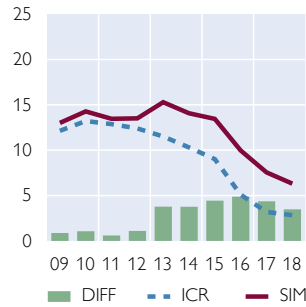**Manufacturing (C)**

% and percentage points
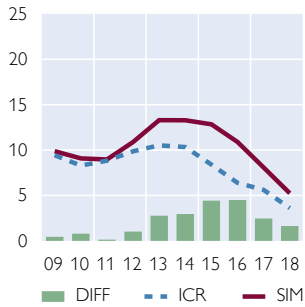
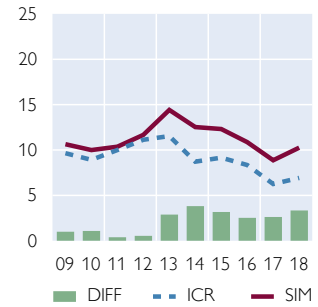**Real estate-related industries (F, L)**

% and percentage points

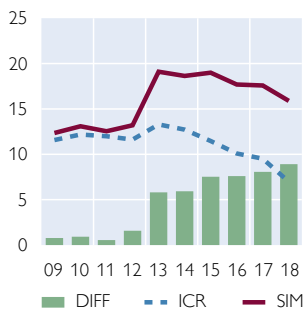**Distributive industries (G, H, I)**

% and percentage points
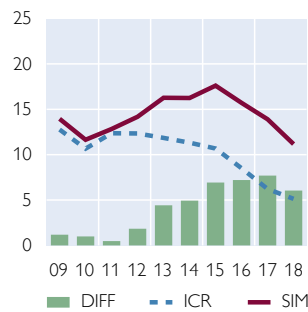
Other

% and percentage points
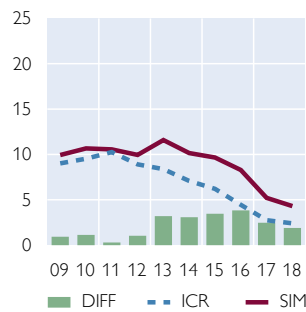

By firm size
Large

% and percentage points

Medium

% and percentage points

Small

% and percentage points

By investment ratio
1st quartile

% and percentage points

2nd quartile

% and percentage points

3rd quartile

% and percentage points
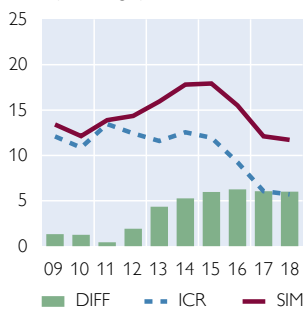
4th quartile

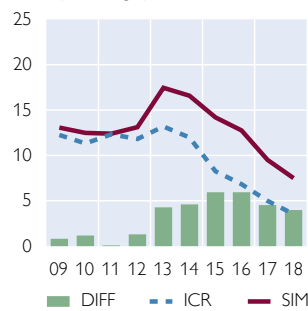*% and percentage points*
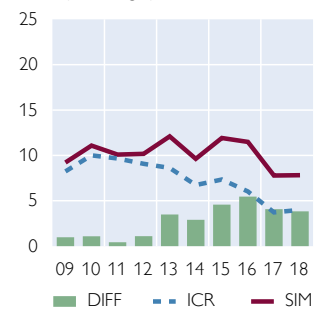
By investment ratio
1st quartile

% and percentage points
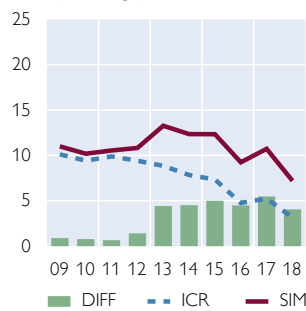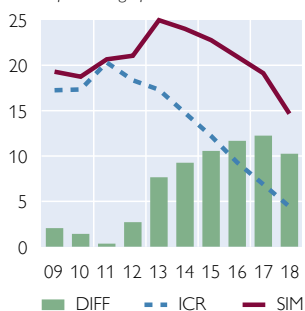
2nd quartile

% and percentage points
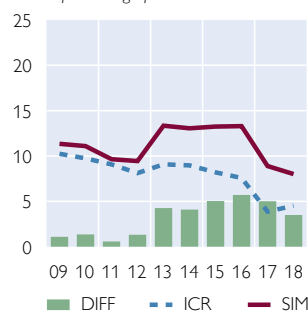
3rd quartile

% and percentage points
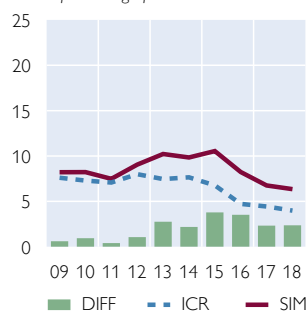
4th quartile

% and percentage points
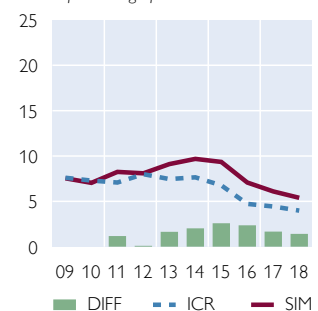
Source: OeNB, authors' calculations.

Note: ICR: zombie share according to ICR definition in %, SIM: simulated zombie share in %, DIFF: difference between zombie share according to ICR definition and simulated zombie share in percentage points. The first quartile is the quartile with the lowest and the fourth with the highest values in the respective characteristics.

4 Summary and conclusions

This paper provides first results on the incidence of zombie firms in Austria, based on three definitions. The definitions all relate to companies' interest expenses but address different aspects thereof, namely the relationship of interest expenses to liabilities and enhance this information either with firms' probability of default or their interest coverage ratio. Reflecting these conceptual differences, the definitions employed in this paper identify different sets of companies as zombies, but they all indicate a substantial fall in the share of zombies between 2009 and 2018, concerning all industries and firm sizes, albeit to different degrees. Although the drop of the zombie share was particularly strong for highly leveraged enterprises, at the end of our observation period zombie firms still had less favorable risk characteristics than non-zombie firms, such as a slightly lower equity ratio and a markedly higher probability to default. This can be seen as an indication that our definitions are able to designate financially weak firms as zombies.

A counterfactual exercise suggests that the fall in the interest rate over the period under review played a large role in the reduction of the zombie share according to the ICR definition. Under the assumption of constant interest rates throughout the period under study, the zombie share would have risen especially in those years in which the money market rate fell and would have remained above the observed rate until the end of the observation period. The difference between the observed and the simulated zombie share is more pronounced for real estate-related industries (whose business model is very credit-intensive), more leveraged firms (for which the interest level is more relevant), and larger companies.

Yet, zombie status is not necessarily permanent. Looking at those firms for which we have financial statements information for the entire observation period, we have shown that most zombie firms manage to exit from zombie status.

There are several limitations to the analysis presented here. These limitations include the very notion of what constitutes a "zombie firm." The term goes beyond that of a financially distressed firm and includes the capability to meet interest obligations. The definitions employed here touch upon different aspects of those capabilities, and the differences in the outcomes in our calculations based on the different definitions point to the vagaries of this term.

Another point relates to the data on which this analysis is based. In the database from which our sample is derived, well-performing firms are most likely overrepresented, implying that zombies might be underrepresented in this sample. At the same time, as we had to confine ourselves to a two-year time span with a low ICR when classifying companies as zombie firms instead of three years as used by most other papers, the zombie share is higher than it would have been if we could have extended that time span to three years because firms are less likely to have a low ICR over a longer period and many zombies recover at some point. Besides, as pointed out, data coverage is uneven across years and sample changes cannot be attributed to exit and entry of firms from and to the market, but they are often due to the way the database is maintained. Moreover, the interest expenses variable that we employ cannot distinguish between the type of debt on which interest payments are spent, an aspect that is of particular relevance with regard to calculating preferential interest rates.

As to the implications for monetary policy, the simulation exercise presented above suggests that the share of zombie firms would have been well above the observed

share as a result of non-falling money market interest rates. However, our simulation can only capture the mechanical effects of lower rates on zombie shares and does not take into account the effects of lower interest rates on aggregate demand, sales prospects for firms and economic growth, which have likely raised the denominator of the ICR. At the same time, the low interest rates might have been an incentive for some firms to increase risk-taking and leverage. The low interest rate environment and the search for yield that it caused in general and the compression of credit spreads through loose monetary policy in particular have been of particular benefit to firms with higher credit risks.

One big unknown is, of course, the fallout from the current pandemic. With our data reaching only until 2018, it is not possible to assess effects of the pandemic on the share of zombie firms. Somewhat reassuringly, zombie firms were not more prevalent in the group of industries that were hit particularly hard by the pandemic. In view of the measures taken to support the corporate sector in reaction to the pandemic, there are increasing concerns that some firms may be able to survive only as long as these support measures continue. While over the short term, additional loans are indispensable to make up for lost revenues and to keep enterprises afloat, they are bound to increase interest obligations over the medium and long term, which will increase the number of firms that fall under the ICR zombie criterion. Likewise, to the extent that conditions for government support measures require banks to grant favorable interest rates to companies, the same might be true for zombie firms according to the definitions that comprise preferential interest rates.

The analysis presented here could be enhanced in several directions. First, in order to get a better understanding of the nature of zombie firms, we could dig deeper into the anatomy of the zombie population by including additional firm features (e.g. differentiating between tangible and intangible investment, profitability, ownership). Second, the analysis could be enhanced by looking more closely at the relationship between zombification and productivity to assess if and to what extent zombies are indeed less productive than non-zombies, as well as the implications for overall productivity. A third strand could be the relationship between zombie firms and banks. This could include firms' dependency on bank loans, e.g. their share in total debt as well as, more importantly, combining the dataset employed for this article with bank data in order to study the interaction between bank characteristics (for example their rating) and their propensity to lend to zombie firms. Fourth, the definitions could be further elaborated on. For example, for the simulated ICR zombie share we could use alternative reference rates to track the effects of monetary policy during the period under review, such as a Taylor rule-based rate, instead of the money market rate currently employed. In the same vein, it might be worthwhile to investigate if and how former zombies differ from firms that never had zombie status and which factors contribute to recovery from zombie status.

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Annex

A1 Summary statistics of the sample

Table A1

Summary statistics

		Mean	Standard deviation	25% quantile	Median	75% quantile
Balance sheet total	EUR thousand	44,635	220,696	2,207	7,364	24,101
EBIT	EUR thousand	2,027	15,676	39	260	1,076
Interest expenses	EUR thousand	577	5,277	11	52	217
Age	Years	21	19	8	16	28
Equity ratio	%	22	1,000	15	32	51
Investment ratio	%	8	15	1	3	9

Source: OeNB, authors' calculations.

A2 Industry reclassification of the firms in the sample

Table A2

Reclassification by NACE code

NACE code	Industries
A – Agriculture, forestry and fishing	Other
B – Mining and quarrying	
C – Manufacturing	Manufacturing
D – Electricity, gas, steam and air conditioning supply	Other
E – Water supply; sewerage; waste management and remediation activities	
F – Construction	Real estate-related industries
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Distributive industries
H – Transporting and storage	
I – Accommodation and food service activities	
J – Information and communication	Other
K – Financial and insurance activities	
L – Real estate activities	Real estate related industries
M – Professional, scientific and technical activities[1]	Other
N – Administrative and support service activities	
O – Public administration and defense; compulsory social security	
P – Education	
Q – Human health and social work activities	
R – Arts, entertainment and recreation	
S – Other services activities	
T – Activities of hoseholds as employers; undifferentiated goods – and services – producing activities of households for own use	Not in the dataset
U – Activities of extraterritorial organisations and bodies	

Source: Eurostat, authors' reclassification.

[1] *Without head offices and holding companies.*

A3 Zombie share by firm characteristics according to the PIR-PD and PIR-ICR definitions

In annex 3, we analyze the evolution of the zombie share and the characteristics of zombie firms according to the PIR-PD and PIR-ICR definitions, using the same industry breakdown as for the ICR definition in subsection 3.2. The industry breakdown and firm characteristics for the PIR-PD definition are shown in chart A1 respectively table A3. The share of zombie firms according to the PIR-PD definition decreases for all industries, however to a different extent. The drop

between 2009 and 2018 was most pronounced for the distributive industries (–15.4 percentage points) but least pronounced for the real estate-related industries (–7.8 percentage points). In 2018, the shares of firms that are identified as zombies were above the overall average in manufacturing (3.8%) and in the real estate-related industries (2.6%) but below the value for the whole corporate sector in the distributive industries (1.4%), and in particular in other industries (0.7%). This is also reflected in the industry affiliation of zombies and non-zombies (table A3, lower panel). 42.2% of all zombies, but only 35.3% of non-zombies were real estate-related companies. Manufacturing companies were also overrepresented among zombies. At the same time, companies classified as others account only for 4.7% of all zombies but for 14.4% of all non-zombies.

Regarding firm size, according to the PIR-PD definition, smaller firms are more likely to be classified as a zombie than large companies. Accordingly, in 2018 the zombie share was 2.3% for small companies, 3.0% for medium-sized companies but only 0.9% for large companies. Consequently, zombie firms were smaller than non-zombies measured by the average balance sheet total (table A3, upper panel). The median balance sheet total of zombie firms amounted to 93.0% of the median balance sheet of non-zombies; however, the mean balance sheet size is only a third of non-zombies. As a consequence, the asset zombie share was with 0.7% considerably lower than the zombie share in firms (2.2%).

Regarding the equity ratio, over the whole observation period, zombies were more prevalent among companies with a low equity ratio. Consequently, in 2018 the equity ratio of zombies was considerably lower than the equity ratio of non-zombies (median 27.9% against 36.1%). The less favorable risk characteristics of zombie firms is also reflected in the probability of default. The median PD of zombies was 1.3% in 2018 compared to 0.7% for non-zombies. As to the investment ratio, there is no difference between the average investment ratio of zombies and non-zombies. Furthermore, regarding age, zombie firms were slightly older than non-zombie firms.

The industry breakdown and firm characteristics for the PIR-ICR definition is shown in chart A2 respectively table A4. The share of zombie firms according to the PIR-ICR definition decreases, as for the PIR-PD definition, for all industries. The most prominent drop in the share of zombie firms between 2009 and 2018 took place in the distributive industries (–5.9 percentage points) and the least prominent drop in manufacturing (–1.8 percentage points). In 2018, the share of zombie firms is the highest in manufacturing (3.8%) and the lowest in the sector related to other industries (0.7%). Regarding firm size, larger firms are more likely to be classified as zombies than smaller firms, according to the PIR-ICR definition. In 2018, the zombie share for large firms was 1.9% and for small firms 0.4%. Consequently, the median balance sheet total of zombie firms is four times the median balance sheet total of non-zombies.

Regarding the equity ratio, the picture is somehow conflicting. For most years of the observation period, more zombies can be identified among firms with a very low equity ratio (first quartile). However, in 2018 the share of zombie firms is higher among firms with a comparatively high equity ratio (fourth quartile). In fact, the mean equity ratio of zombie firms (41.5%) in 2018 is above the mean equity ratio of non-zombies (36.8%). The median default probability of zombie firms in 2018 is slightly higher than the median PD of non-zombie firms, whereas the opposite is true when mean is used to calculate the average. Regarding age, zombie firms according to the PIR-ICR definition are older than non-zombies.

Chart A1

Zombie share in Austria by firm characteristics – PIR-PD

By industry classification

%

— Manufacturing — Real estate — Distributive
— Other ▪ ▪ Total

By firm size

%

— Large — Medium — Small ▪ ▪ Total

By investment ratio

%

— 1st quartile — 2nd quartile — 3rd quartile
— 4th quartile ▪ ▪ Total

By equity ratio

%

— 1st quartile — 2nd quartile — 3rd quartile
— 4th quartile ▪ ▪ Total

Source: OeNB, authors' calculations.
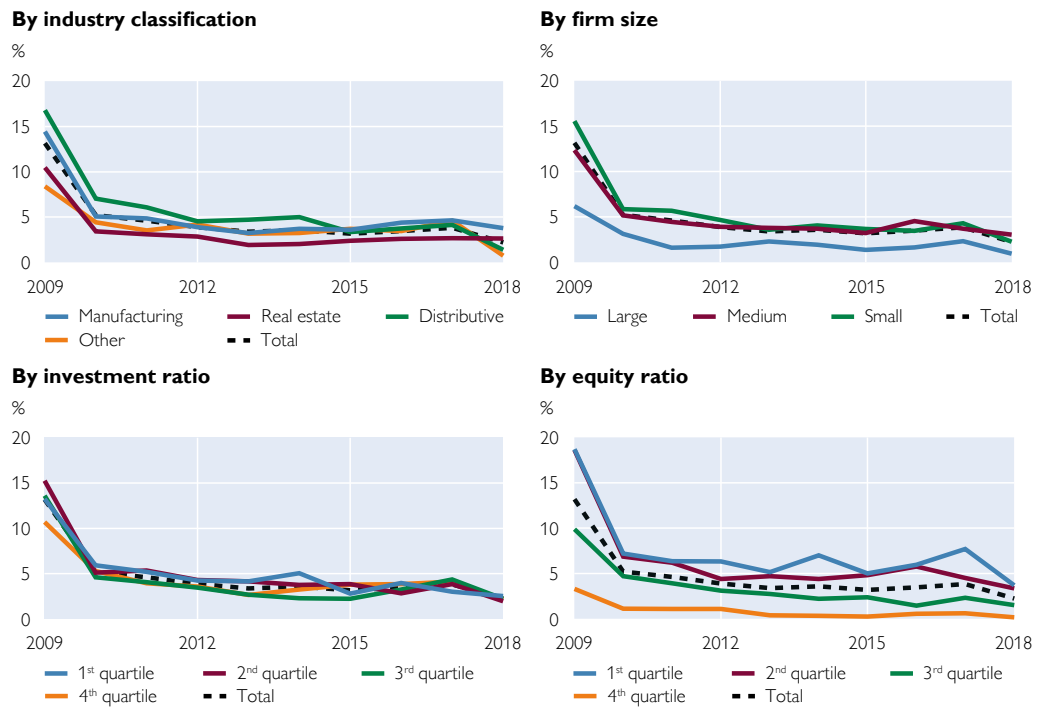
Chart A2

Zombie share in Austria by firm characteristics – PIR-ICR

By industry classification

%

— Manufacturing — Real estate — Distributive
— Other ▪ ▪ Total

By firm size

%

— Large — Medium — Small ▪ ▪ Total

By investment ratio

%

— 1st quartile — 2nd quartile — 3rd quartile
— 4th quartile ▪ ▪ Total

By equity ratio

%

— 1st quartile — 2nd quartile — 3rd quartile
— 4th quartile ▪ ▪ Total

Source: OeNB, authors' calculations.
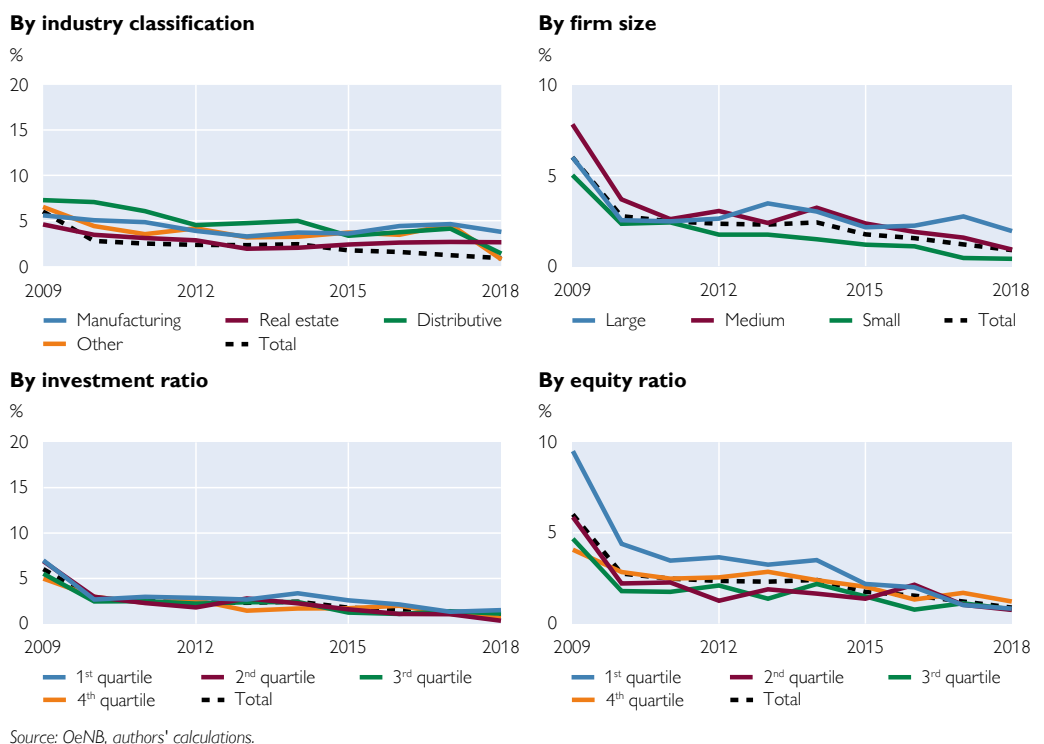
Table A3

Comparing zombie and non-zombie firms according to PIR-PD – 2018

		Zombies		Non-zombies	
		Mean	Median	Mean	Median
Characteristics of zombie and non-zombie firms					
Balance sheet total	EUR million	16.1	8.3	50.5	8.9
Age	Years	27.2	21.0	24.1	18.0
Equity ratio	%	25.0	27.9	36.1	36.0
Probability of default	%	2.1	1.3	0.7	0.4
Investment ratio	%	9.5	4.9	9.5	4.9
Industry affiliation of zombie and non-zombie firms					
Manufacturing	%	34.4		20.0	
Real estate-related industries	%	42.2		35.3	
Distributive industries	%	18.8		30.4	
Other	%	4.7		14.4	
Total	%	100.0		100.0	

Source: OeNB, authors' calculations.

Table A4

Comparing zombie and non-zombie firms according to PIR-ICR – 2018

		Zombies		Non-zombies	
		Mean	Median	Mean	Median
Characteristics of zombie and non-zombie firms					
Balance sheet total	EUR million	98.1	40.6	55.2	10.4
Age	Years	30.0	20.0	25.1	19.0
Equity ratio	%	41.5	43.2	36.8	36.0
Probability of default	%	0.6	0.5	0.7	0.4
Investment ratio	%	6.3	4.6	9.1	4.9
Industry affiliation of zombie and non-zombie firms					
Manufacturing	%	27.3		21.2	
Real estate-related industries	%	40.9		35.4	
Distributive industries	%	13.6		29.6	
Other	%	18.2		13.9	
Total	%	100.0		100.0	

Source: OeNB, authors' calculations.

A4 EBIT versus EBITDA

The choice of the profit measure can affect the calculated ICR and as a consequence the incidence of zombie firms considerably. Most papers use earnings before interest and taxes (EBIT), i.e., earnings net of depreciation and amortization, as operating income. As EBIT comprises operating income and expenses but does not include the financial result (as reflected in financial assets and investments), the interest result or the special tax situation of the company, it gauges a company's operative performance. Since EBIT is formed before interest expenses are taken into account, it is a useful metric to calculate ICR. However, the use of EBIT has not been undisputed. Rodano and Sette (2019) have suggested to use EBITDA (earnings before interests, taxes, depreciation and amortization) instead, arguing that – as EBIT does not include depreciation and amortization – it is more likely to

classify firms as zombies which invested heavily in previous years and amortized that investment quickly. However, depreciation is also a type of cost, namely the cost of consuming productive capacity, which can be substantial for capital-intensive companies. While depreciation and amortization are not actual cash outflows, they reduce the value of a company's capital and/or financial assets and thus the value of its total assets. Using EBITDA would not account for these losses in value. By adding back depreciation and amortization to earnings, EBITDA might be suitable for international comparisons where differences in depreciation or amortization practices, goodwill treatment, taxation and so on may distort bottom line measures. For the purpose of the analysis within one country, the different effects of depreciation and amortization on companies (or industries) with different capital intensity make it advisable to use EBIT.