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**Corporate indebtedness and macroeconomic
stabilisation from a long-term perspective**

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Corporate debt levels have risen sharply in advanced and emerging economies before and during the Covid pandemic. Will corporate debt overhang slow down the recovery from the pandemic? This paper studies the aftermath of corporate debt surges in long-run cross country data. History shows that the macro-economic aftermath of corporate debt booms is typically benign. Three caveats apply, but none of them currently raises alarm bells: (i) the sectoral composition of corporate debt must not be tilted towards investments in the non-tradable sectors; (ii) legal institutions for debt reorganization must work efficiently; (iii) in bank-based financial systems, stringent banking supervision must prevent the emergence or survival of zombie companies.

Introduction

Corporate debt stands at historical highs in many countries. In the decade after the global financial crisis, in a time of low interest rates, businesses in many countries have increased borrowing from banks and markets. Time-tested indicators of exuberance in corporate lending markets such as the share of high yield bond issuance, covenant-lite lending and issuance of collateralized loan obligations (CLOs) were all flashing red at some point in recent years. Moreover, while quantities of credit were rising fast, the price of corporate credit risk in financial markets fell substantially. Lower credit spreads despite higher volumes and lighter covenants signalled to many that a supply-driven corporate credit boom had taken hold which could end badly and make a future downturn much more severe (Yellen 2019).

This was the picture before the Covid pandemic. The effects of the pandemic have exacerbated the situation in two important ways. First, corporate earnings have temporarily collapsed in most industries, lowering debt service capacity. Moreover, accelerated structural change in the aftermath of the pandemic could mean that some sectors or business models are permanently impaired. Second, to bridge the revenue shortfall government facilities have been set up during the pandemic that have offered liquidity at favourable terms. They increased corporate liabilities even further. In the year 2020 alone, corporate debt to GDP levels surged by about 15pp in emerging markets and by about 10pp in advanced economies, as BIS data show.

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Looking at the entire post-2008 era, corporate debt has increased by about 20pp relative to GDP both in the Eurozone and the U.S., and by more 50pp in emerging markets.

This paper aims to look into the future by looking back. I will summarize the macroeconomic history of past corporate credit booms and their after-effects that recent research has uncovered (Jordà, Kornejew, Schularick, and Taylor 2020; Mueller and Verner 2021). The core question I want to address is whether the corporate debt surge that we have observed before and during the pandemic means that we have to dial down expectations for a swift recovery when the health restrictions are over. Will corporate debt overhang become a millstone around the neck of the economy?

Two historical analogies are often invoked to highlight the risks that debt overhang could pose for the recovery. The first reference point is the experience after the global financial crisis that highlighted the role of household debt overhang and balance sheet repair for aggregate spending and recovery speed (Dynan 2012; Mian, Rao and Sufi 2013). Since then research has shown that the aftermath of household debt booms is often marked by prolonged recessions and slow recoveries (Jordà, Schularick and Taylor 2013; Mian, Sufi and Verner 2017).

The second example is the Japanese experience in the 1990s. When the Japanese financial bubble burst, corporates were left with significant debt on balance their balance sheets, often asset-based lending linked to the commercial real estate sector. The debt overhang, slow restructuring of bad debts and ongoing lending to “zombie” companies is seen as an important reason behind the prolonged recession and depressed productivity growth in Japan’s lost decades (Peek and Rosengren 2005; Caballero, Hoshi and Kashyap 2008).

In this paper, I aim to move beyond anecdotes and specific references and synthesize what we know about the macroeconomic after-effects of corporate debt booms. I will then apply these insights from recent research to the current situation in Europe and the U.S. My perspective will emphasize macroeconomic evidence coming from long-run cross-country data. This is not because there isn’t anything to learn from micro data. On the contrary, micro data ultimately hold the key to identifying the mechanisms behind macro phenomena. Moreover, the concerns that corporate debt overhang might derail the economy are micro-founded themselves. Following Myers (1977) seminal insight that high debt levels can lead to under-investment by firms, a series of important empirical papers have studied firm-level data and found evidence for the mechanism being at work on the micro level (Lang, Ofek, and Stulz 1996; Hennessey 2004; Kalemli-Özcan, Laeven, and Moreno 2020; Albuquerque 2021).

But do the micro-level effects translate into bigger macro problems? Beyond firm-level behaviour, we need a better understanding of the macroeconomic effects of corporate debt (Brunnermeier and Krishnamurthy, 2020). The long-run macro data used here have some desirable properties in this regard. They allow us to study the issue over different corporate debt cycles, bringing higher external validity and a better understanding of the role of firm debt for business cycle dynamics. Moreover, macro data capture the general equilibrium effects that are lost in micro data. General equilibrium effects can mean that the findings of micro and macro studies do not always align. If that’s the case, it is important for policy-makers to be aware of conflicting evidence from different approaches – and an important task for researchers to investigate the causes of the disagreement.

The overall message of my history of corporate credit cycles will be that the macroeconomic fall-out from corporate credit booms tends to be small. Unlike household credit booms, corporate debt cycles are not systematically associated with subpar macroeconomic performance. The household debt overhang that we witnessed post-2008 is likely not the correct frame of reference at the current juncture. Over the course of modern business cycles, more corporate credit-intensive expansion phases are not followed by deeper recessions and slower recoveries.

But I will also point to three important caveats to this borderline Panglossian view of corporate debt build-ups. First, not all corporate credit booms are alike. The composition of the corporate

debt boom matters, as recent research by Mueller and Verner (2021) has shown. Non-tradable debt is associated with macroeconomic boom and bust dynamics akin to household debt booms. The aftermath of non-tradable corporate credit booms is often marked by persistent economic weakness. As a corollary, whether corporate lending is mostly asset-based or cash-flow based following the recent research by Lian and Ma (2021) may also play a role for the aftermath of corporate debt booms. Cash-flow lending could be less prone to asset price boom-bust cycles than asset-based lending booms, although little is known to date about predominant forms of lending in individual sectors and the interaction of contract-types and sectoral lending booms. Second, debt reorganization regimes and bankruptcy codes must function reasonably smoothly and encourage swift and efficient reorganization of corporate balance sheets (Becker and Josephson 2016; Jordà, Kornejew, Schularick, Taylor 2020). If liquidation or reorganization are slow and costly, the macro-effects of corporate debt overhang become measurable, and in some cases sizeable. Corporate bankruptcy proceedings are complex legal processes and more research is necessary to understand the particular frictions that matter most in this context. Until today, insolvency processes vary widely across EU member states. While progress has been made in recent years, important steps remains to establish an EU-wide counterpart to the Chapter 11 system in the US (Becker 2019).

The third caveat, and possibly a risk in the European context today, relates to the origination side of corporate debt (Caballero, Hoshi and Kashyap 2008; Albuquerque 2021). In particular, in bank-based financial systems the risk exists that weakly capitalized or weakly supervised banks have incentives to avoid losses and evergreen bad loans in the hope of a future recovery of asset values or an improvement in the financial position of the borrower. “Extend and pretend” policies leading to “zombie lending” were arguably a major impediment to Japan’s recovery from the crisis in the 1990s (Caballero, Hoshi and Kashyap 2008). Evidence of zombie lending has also been uncovered in Europe after the global financial crisis (Schivardi, Sette and Tabellini 2017; Storz, Koetter, Setzer and Westphal 2017, Andrews and Petroulakis 2019, Acharya, Crosignani, Eisert, and Eufinger 2020). Macro-historical evidence that I discuss below also shows that corporate debt booms are economically costlier and produce “zombies” in their aftermath when banking supervision is weak.

My main take-away, however, will be that in the current situation all three caveats only apply to a limited extent, albeit with some differentiation between economies. With respect to the sectoral composition of credit in the past decade it was not particularly heavy in the non-tradable sector. With the partial exception of the U.S. and France, non-tradable debt growth has been relatively muted, and even in those two countries tradable credit grew faster than non-tradable credit. Asset-based lending is comparatively rare in the U.S. and Europe so that the potential for knock-on effects from asset prices declines to lending remains limited.

While progress has been made in Europe to align and accelerate corporate debt reorganization, more work needs to be done to establish an efficient “federal” insolvency regime and corresponding specialized courts that rival the American Chapter 11 system (Becker 2019). This being said, European countries such as Italy that are sometimes singled out for lengthy court proceedings did not have corporate debt booms in the past decade but came into the pandemic after a decade of corporate debt reduction. Italy’s corporate debt ratio at the end of 2020 (including the Covid effects) was still about 10pp lower relative to GDP than in 2016.

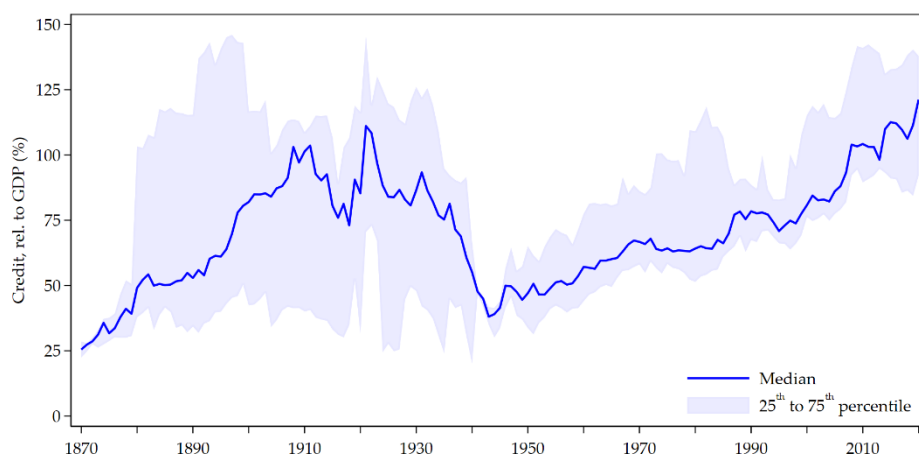
Arguably, the most relevant caveat in the European context at this stage relates to the origination side. The dominant creditors in European corporate debt markets remain banks. Progress on increasing the role of corporate bond markets and high-yield markets has not been rapid so that corporate lending remains dominated by the banking sector. While the situation of the European banks, both with regard to capitalization and supervision, is better than in Japan in the 1990s, some recent research still points to overly cosy relationships between banks and struggling firms (Andrews and Petroulakis 2019, Acharya, Crosignani, Eisert, and Eufinger 2020). Such evidence could be indicative of larger problems. Europe needs to take its post-2008 lessons on

stress tests and half-hearted clean-ups seriously. When the Covid-related loan losses appear, they must be aggressively realized, not hidden in opaque corners of banks' balance sheets. Precautionary and mandatory recapitalisations after severe stress tests remain an option to minimize the risks and maximize growth potential (Schularick and Steffen 2020; Boot et al. 2020). They could also be a chance to clean up the remaining legacy issues from the last crisis. From the perspective of the macroeconomic history of corporate debt booms the main policy implications are reasonably clear. There is nothing to fear but a policy of kicking the can down the road. Default rates will likely rise and not all business models have a future. Swift reorganization or liquidation of insolvent businesses is the single best policy to deal with corporate debt booms. For this to occur, banks must be well supervised and be forced to quickly realize losses when they occur.

Corporate indebtedness in historical perspective

I will start the discussion by reproducing a figure from our recent work (Jordà, Kornejew, Schularick and Taylor 2020). Figure 1 shows the evolution of business credit from a long-term perspective. We plot the cross-country mean and the inter-quartile-range of business credit relative to GDP for a sample of 16 advanced economies. Historically, business credit has ranged between 50% and 100% of GDP for most advanced countries. The series trends upwards in the lead-up to WW1 before entering a period of high volatility in the interwar years, followed by a sharp reduction during the Great Depression and WW2. Since WW2, business credit has doubled from about 50% to 100% of GDP today. By this measure, corporate debt today stands at its highest level in the past 150 years albeit not far above previous peaks.

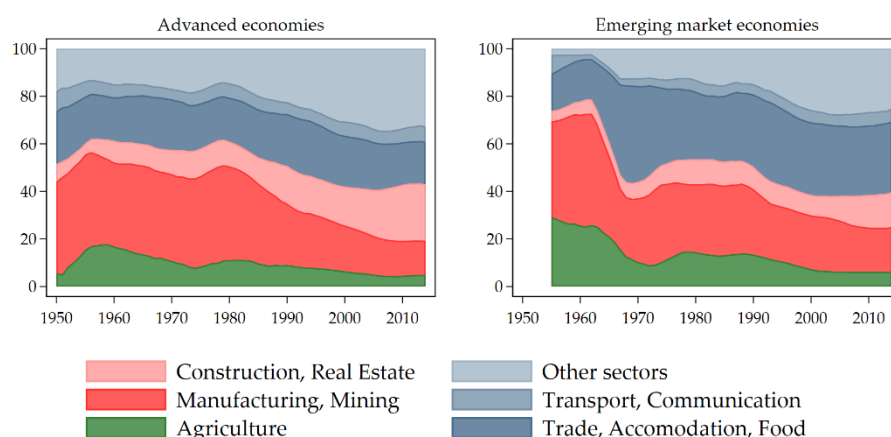
Figure 1 Business Credit-to-GDP ratios since 1870



Notes: Cross-sectional statistics based on a sample of 18 advanced economies (Australia, Belgium, Canada, Finland, France, Germany, Italy, Ireland, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA). Data taken from JST Macro-History database and Jordà, Kornejew, Schularick and Taylor (2020).

Thanks to the recent work of Mueller and Verner (2021), we also have information on long-run sectoral trends in corporate debt. They are marked by a fall in the share of manufacturing and a rise of real estate and construction lending. Figure 2 shows that other sectors, predominantly services, have also increased in importance in corporate lending. In emerging markets, mining, trade and manufacturing accounts for a larger share of overall corporate debt, making this share of lending more sensitive to commodity prices.

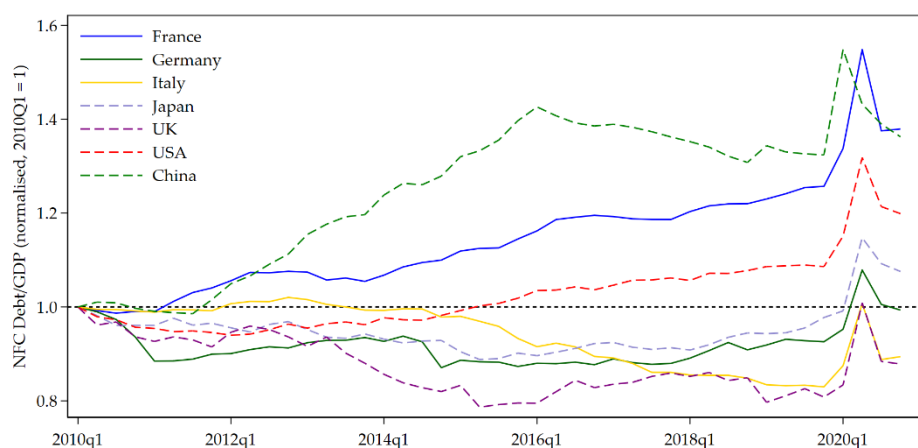
Figure 2 Decomposition of bank lending to non-financial businesses



Notes: Reproduced from Müller and Verner (2021).

Figure 1 directs our attention to the fact that, on average, in advanced economies corporate debt had increased substantially before the Covid-shock hit. But the mean is masking substantial heterogeneity across countries. Some countries witnessed rather pronounced increases in corporate debt while others deleveraged. Using BIS data, this heterogeneity is displayed in Figure 3. The graph reveals substantial cross-country differences in corporate credit growth over the past decade. In various European countries, particularly in the south of the Eurozone, the corporate sector has deleveraged and regained balance sheet strength. In other economies, corporates sharply increased borrowing in the decade before the pandemic. Among the major economies, France and China stand out as credit-boomers, with the U.S. coming third. By contrast, business sectors in Japan, Germany, Italy and the UK are barely more leveraged today (relative to GDP) than they were over a decade ago.

Figure 3 Change in corporate debt-to-GDP since 2010, selected countries

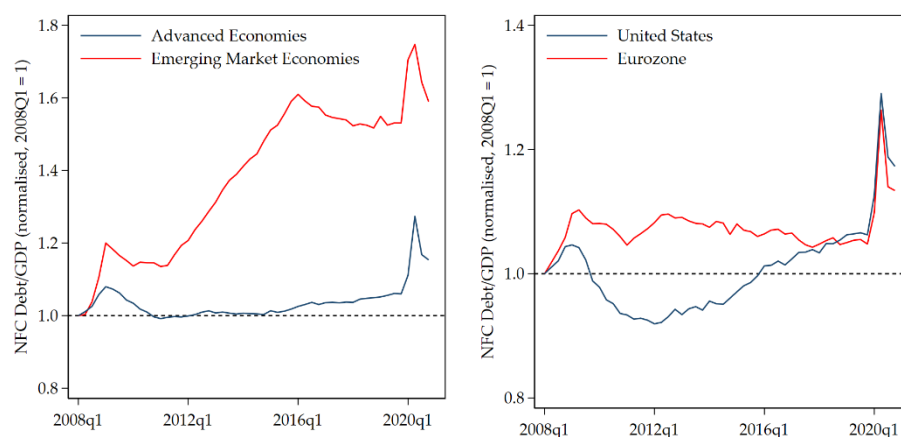


Notes: Calculations based on the BIS database on credit to the non-financial sector.

Aggregating the country trends leads to interesting insights for the different country groups. Figure 4 differentiates the trends for emerging and advanced economies, as well as for the Eurozone and the U.S. Across all countries, the corporate debt over GDP has increased by approximately 25 pp since the global financial crisis, but the increase was much stronger in emerging markets, driven largely by China. In emerging markets corporate debt levels have

doubled in relation to GDP since 2008. While China accounts for a large share of this increase, similar trends can be observed in Indonesia, Mexico and South Africa, among others. Within the advanced economies, corporate debt has risen by similar magnitudes in the U.S. and the Eurozone, but the time path differs markedly. The U.S. business sector deleveraged substantially in the immediate years after the global financial crisis. Yet since 2016, companies have used the low interest environment to leverage up. U.S. corporate debt has risen by 20pp relative to GDP within a short period. In the Eurozone, a similar deleveraging never occurred after the global financial crisis. With the exception of France, corporate debt flat-lined for a decade before increasing sharply in the pandemic.

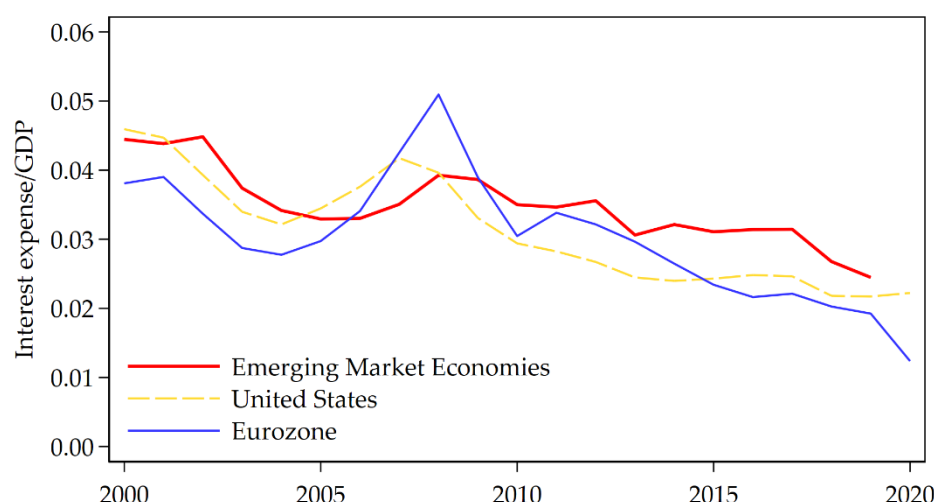
Figure 4 Change in corporate debt-to-GDP ratios since 2008, by country group



Notes: Calculations based on the BIS database on credit to the non-financial sector, covering 15 emerging market and 21 advanced economies, GDP-weighted averages.

It is important to note that the pricing of corporate debt has not reacted to rising debt levels. As spreads and risk-free interest rates have fallen, interest service costs have dropped sharply, both in advanced and emerging market economies, despite rising corporate debt levels. This is shown in Figure 5. Corporate debt sustainability is highly sensitive to an increase in interest rates, but interest coverage has improved, reducing financial vulnerabilities in the corporate sector (as long as interest rates stay at their current low levels). A similar point can be made with regard to overall leverage ratios (debt-to-asset) that have not increased meaningfully on average as asset prices have remained high throughout the pandemic.

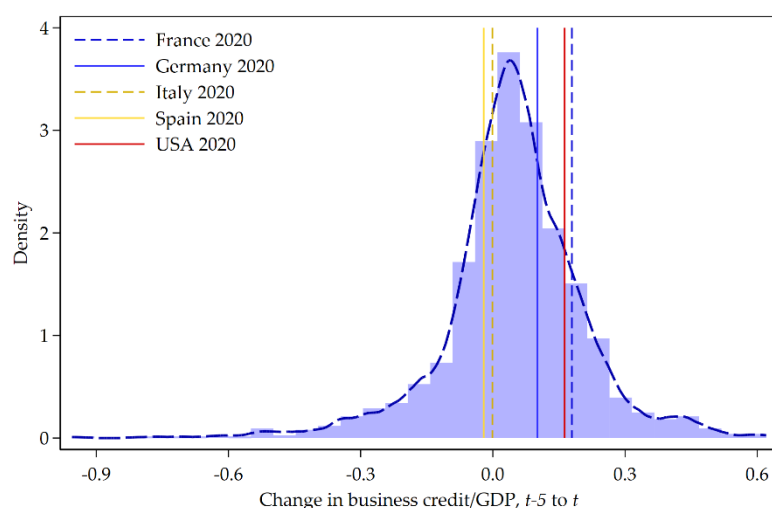
Figure 5 Aggregate interest expense burden low despite higher debt



Notes: Calculations based on OECD data, covering 11 emerging market economies and 21 advanced economies, unweighted averages.

Bringing these data together, we can look at the corporate credit boom, including both the pre-Covid rise in corporate indebtedness and the increase that occurred during the pandemic. Figure 6 shows the distribution of all 5-year changes in corporate debt to GDP ratios over the past century and a half in advanced economies. The heterogeneity stands out. Despite the Covid-related debt increase, in Italy and Spain the 5-year debt increase is on the left side of the distribution, while Germany is only slightly above historical norms. The two main exceptions among the advanced economies are France and the U.S. whose corporate credit increases were both pronounced in the past 5-years by historical standards.

Figure 6 The 2015-2020 corporate credit boom in comparison



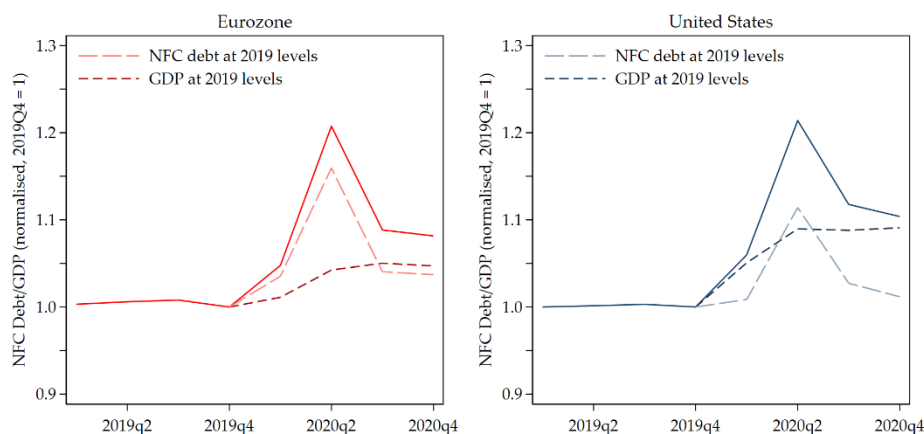
Notes: Reproduced following Jordà, Kornejew, Schularick and Taylor (2020). Histogram and kernel density estimate for all country-year observations of 5-year changes in the business credit/GDP ratio from 18 advanced economies since 1870. Vertical lines mark the current business credit cycle phase (including pandemic emergency credit facilities) for selected countries.

This being said, it is important to note that the change in the corporate credit to GDP ratio is driven both by the numerator and the denominator. Figure 7 breaks down the rise of corporate debt in the pandemic into two contributing factors: the drop in GDP and the increase in borrowing. As it turns out, a substantial part of the increase in corporate was due to GDP effects, especially in the Eurozone. With the rebound in production and further normalization, the

increase in the debt ratio will turn out to be much smaller. It is important to acknowledge that the Covid-shock is different. It hit many viable firms that experienced temporary liquidity squeezes, but are otherwise healthy. The European tourism sector comes to mind.

As a consequence, the European corporate debt to GDP ratio will be only a few percentage points above pre-pandemic levels when activity normalizes. The dynamics are somewhat different in the U.S. where the initial GDP drop was less severe so that a larger part of the debt increase was due to higher corporate borrowing. In the U.S., even after the return to 2019 GDP levels, corporate debt to GDP ratios will remain about 10pp higher than before the pandemic.

Figure 7 Decomposition of business credit/GDP dynamics during the pandemic



Notes: Calculations based on the BIS database on credit to the non-financial sector. Eurozone figures are weighted by GDP.

3 Corporate debt and the business cycle

What effects do corporate debt booms have on business cycles? Should we be concerned about the potential effects of corporate debt overhang on investment, growth and productivity going forward? I will approach this question using insights from cross-country long-run data. I will rely heavily on recent work by Mueller and Verner (2021) as well as our own research in Jordà, Kornejew, Schularick and Taylor (2020). Sectoral and macro data can help us identify patterns in the data, test the predictive power of credit aggregates and, in the best of all cases, highlight the crucial mechanisms that are associated with the patterns uncovered. Causality is hard to establish. Exogenous variation in credit growth and leveraged is hard to come by – a problem faced both by micro and macro approaches.

At the microeconomic level, the empirical literature has mostly focused on documenting mechanisms linking corporate debt and firm-level investment decisions and outcomes. Several papers show the adverse investment effects of debt overhang at the firm level (e.g., Lang, Ofek, and Stulz, 1996; Hennessey, 2004; Andrews and Petroulakis 2019, Kalemli-Ozcan, Laeven, and Moreno, 2020; Albuquerque, 2021). These studies suggest that highly levered firms invest less and grow slower. Yet a common issue facing recent micro studies is that the European firm-level data cover the period after the global financial crisis when credit supply disruptions owing to the weak state of the European banking sector are likely to have interacted with firm-level investment decisions.

Many empirical studies find support for some effect of debt levels on firm-level investment and capital allocation. As discussed earlier, even if the effects on the firm-level were clearly

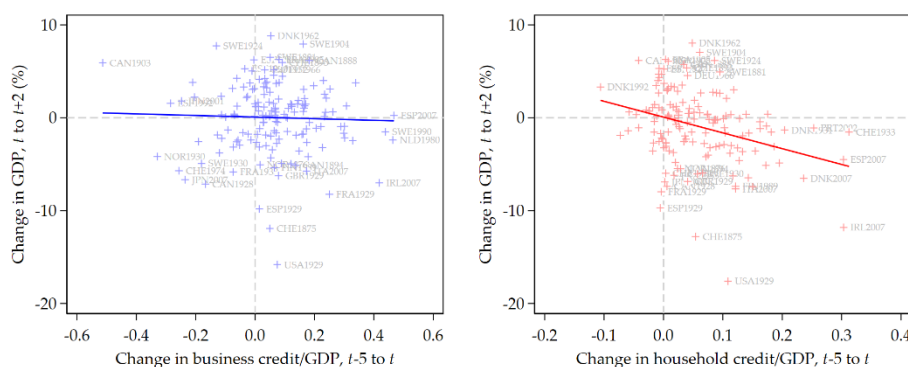
identified and sizeable, it is still possible that they are not strong enough or compensated by other factors on the macro level. For instance, new firms might enter the market and take over market share from constrained firms.

I will start by discussing the core evidence for 18 advanced economies since 1870 studied in Jordà, Kornejew, Schularick, and Taylor (2020). More precisely, I will turn to the near-universe of business cycles in the modern era and start with a simple question: is there a systematic relationship between corporate credit growth in the expansion and the severity of the following recession? As household debt is widely seen as one of the main factors slowing down the recovery from the global financial crisis, I will repeat exactly the same analysis for household debt.

Consider the correlation between business (household) credit booms during the expansion, with the severity of the subsequent recession and the speed of the recovery. Figure 8 plots this relationship for each of the 150 business cycles in the dataset as the scatter of two-year GDP per capita log-difference in the first two years of the recession (from peak year t to $t+2$) against the five-year change in business credit relative to GDP in the preceding 5 years before the peak (from $t-5$ to t).

The visual impression from the scatterplot in Figure 8 reveals the key relationships and is robust to more sophisticated econometric analysis: household credit booms are associated with costly debt overhang, but not business debt run-ups. Corporate credit booms do not depress growth, nor do they depress aggregate investment. These findings corroborate the results of Mian, Sufi and Verner (2017) in a shorter but broader post-WW2 sample.

Figure 8 Business credit booms and recession depth



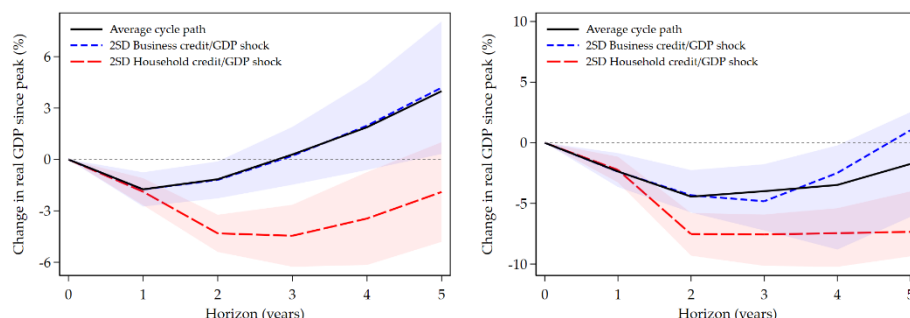
Notes: Reproduced from Jordà, Kornejew, Schularick and Taylor (2020). Scatterplot of business cycle peaks, arranged according to the preceding business credit boom (x-axis) and the subsequent recession trajectory (y-axis). Based on a sample of 18 advanced economies over the time span 1870-2020.

Estimated via local projections (Jordà 2005), Figure 9 shows the effects of a two standard deviation increase in corporate and household debt on the recession trajectory over a 5-year period and controlling for key macro properties of the preceding business cycle expansion. As is visible from the impulse responses, the effects are very different for both types of debt booms. Corporate debt does not impact the business cycle trajectory, while household debt does.

A possible explanation as to why growth and investment are relatively insensitive to a corporate debt boom is that firms may shift to other internal sources of financing, i.e., equity

instead of debt. Yet another possibility could be that corporate debt has no visible mean effects, but it may bring considerable tail risk to the economy. The lower quantiles of the GDP growth distribution may contain potentially extreme losses. Yet once more there is little evidence that corporate debt booms make tail outcomes worse. This is shown on the right hand side of Figure 8 using quantile local projections. Studying the 20th percentile of bad recession outcomes confirms that household credit makes bad recessions even worse. Corporate debt booms do not leave any major traces on growth trajectories.

Figure 9 Recession trajectories after business or household credit booms



Notes: Reproduced from Jordà, Kornejew, Schularick and Taylor (2020). Predicted recession paths after quinquennial credit/GDP booms of 2-standard-deviation above the long-term mean. Predictions for the expected value on the left, predictions for the 20th percentile on the right. Shaded area mark 95% confidence intervals. Estimations based on a sample of 18 advanced economies over the time span 1870-2020.

From the birds-eye perspective of macroeconomic history, the central fact that stands out is that the economic after-effects of household and corporate debt accumulation are very different. Household debt booms are predictive of bad economic outcomes and take a long time to unwind. Corporate debt booms appear to blow over without leaving a lasting imprint on the economy.

Jordà, Kornejew, Schularick and Taylor (2020) discuss that frictions in debt reorganization and insolvency regimes are likely an important reason for the differences between household and business debt. Recent research has pointed to potentially large effects of household debt restructuring (Auclert, Dobbie, and Goldsmith-Pinkham, 2019) if this is possible. Unlike household debt, corporate debt is limited by firm assets and institutions to reorganize debt or liquidate the firm are well established in most economies. More on this below.

Judging by the baseline evidence from macroeconomic history, there is little to fear from corporate debt booms. There exist, however, three important caveats to this benign macro view of the non-phenomenon of corporate debt overhang for business cycle dynamics. I will turn to these now.

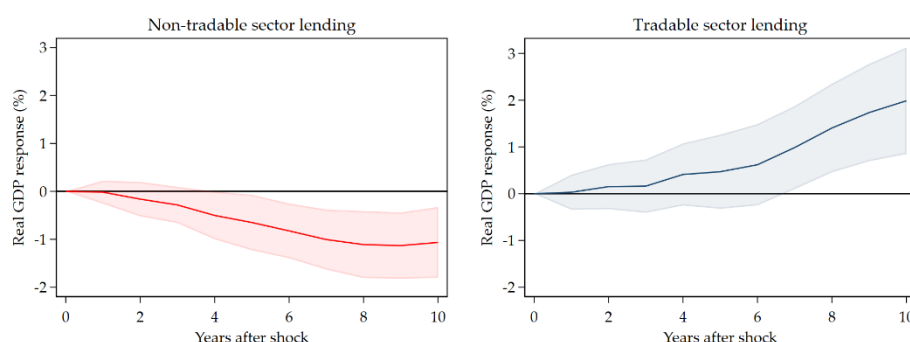
3.1 Caveat 1: not all corporate credit booms are created equal

Research has shown that the sectoral composition of corporate credit booms matters for their aftermath. The work by Mueller and Verner (2021) suggests that tradable vs non-tradable credit booms differ in their real economic outcomes. The higher the share of credit going into the non-tradable sectors, just like household credit, the more problematic the aftermath of a corporate credit boom becomes. Whereas tradable credit booms often lead to growth spurts

and productivity increases, non-tradable credit booms predict negative outcomes as they allocate capital away from the high productivity growth manufacturing sectors into low productivity sectors.

In the words of Mueller and Verner (2021, p.31): “The sectoral allocation of credit—what credit is used for—plays an important role for understanding linkages between the financial sector and the real economy.” Figure 10 below reproduces the key finding of their paper. The impulse responses demonstrate a positive growth impact of credit allocation to tradable sectors, while non-tradable lending booms resemble household credit booms and predict subpar economic outcomes. In short, the allocation and the use of credit matter a great deal for the aftermath of business lending booms.

Figure 10 GDP response to sectoral credit impulse

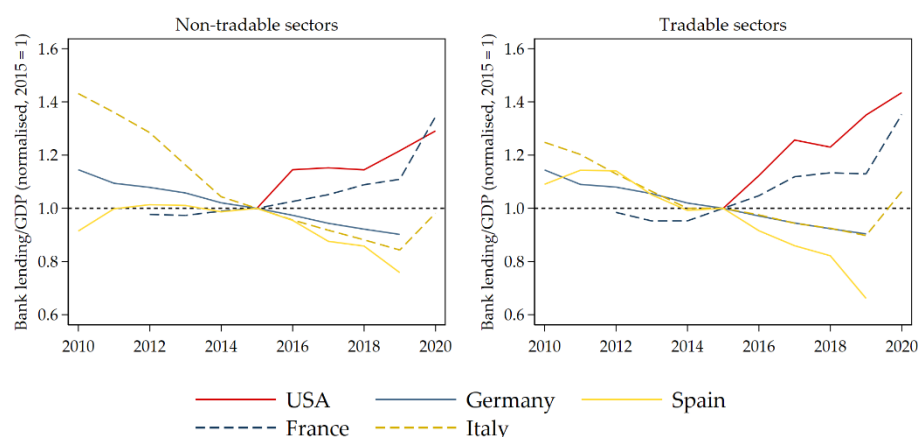


Notes: Reproduced from Müller and Verner (2021). Impulse response functions for a +1 pp. increase in sectoral non-financial business credit/GDP. Shaded area mark 95% confidence intervals. Estimated by local projections on a sample of 116 emerging market and advanced economies over the time span 1940-2014.

It is possible to extend the sectoral credit data of Muller and Verner (2021) for the main economies in the Eurozone and the U.S. until end-2020 and group the sectoral lending data into tradable and non-tradable in a similar way. Figure 11 shows the evolution of both types of credit relative to GDP, indexed to 2015. Note that the data covers both bank lending as well as bond issuance by sector from Bloomberg and include (for most countries) the composition in 2020 as well.

Overall, the picture is quite reassuring on the European side. Among the 4 big Eurozone economies, France, Germany, Italy and Spain, only France witnessed a meaningful non-tradable corporate credit boom. But even in the case of France, the tradable credit boom was larger than the non-tradable one before the pandemic. The same is true for the U.S. where tradable lending boomed after 2015.

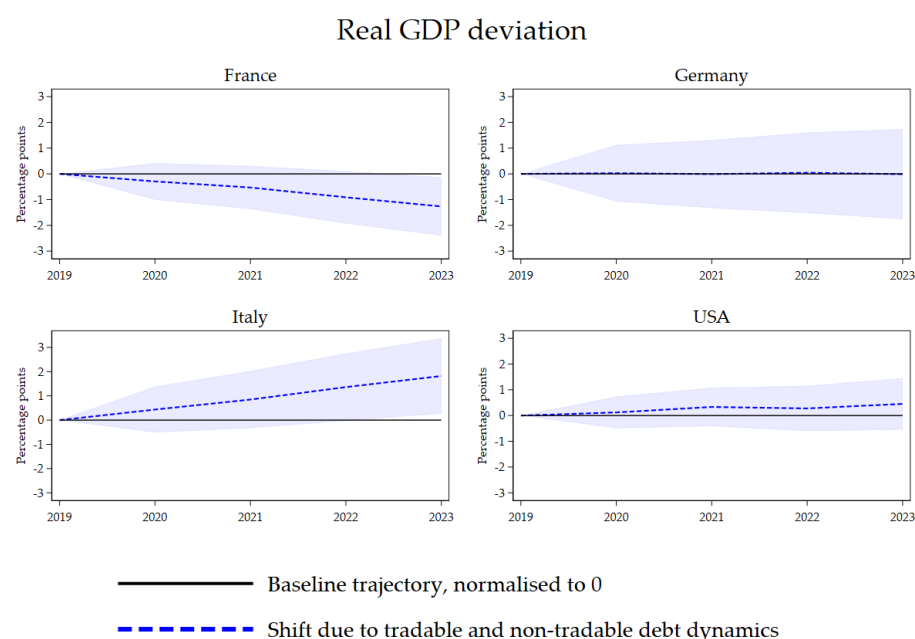
Figure 11 Growth in non-financial business credit, by sector aggregate



Notes: Data sourced from corresponding national central banks and Bloomberg.

Using the change in sectoral credit shares into the framework of Mueller and Verner (2021) allows us to approximate the potential GDP drag that can be expected due to the sectoral composition of the business credit boom. Unsurprisingly, the picture is quite reassuring. Only in France does the sectoral credit composition signal a negative deviation of output growth from the baseline. For the U.S., Germany and Italy, the deviations are negligible or even positive in the case of Italy (due to the fact that the model is linear and the reduction in non-tradable credit mechanically boosts GDP).

Figure 12 Shift in recession paths due to sectoral credit dynamics



Notes: Based in estimates of Müller and Verner (2021) presented in Figure 7 and sectoral credit data sourced from national central banks. Shaded areas mark 95% confidence interval.

We can also look at the composition of the credit boom from another perspective. In recent work, Lian and Ma (2021) pointed to the important distinction between asset-based and cash flow-based lending to corporates. They show that in the U.S. about 80% of lending to corporates is cash flow-based. Future research will have to study if and how the sectoral composition of corporate lending is correlated with the type of lending and how the interaction between the two shapes firm and macro outcomes. An important implication of this work is that firms are less vulnerable to collateral damage from asset price declines, and fire sale amplifications if lending is predominantly cash flow-based. For instance, anecdotal evidence suggests that a particularly large fraction of lending in the Japanese crisis in the 1990s was asset-based and thereby deepened the macroeconomic fall-out of the asset price bust.

Looking at the composition of the corporate lending boom in the past decade does not raise alarm bells in this regard either. Table 1 relies on the dataset compiled by Lian and Ma (2021) and details the shares of cash flow-based and asset-based lending in the most recent 5-year period that is available, 2013-2018. Reassuringly, in the Eurozone economies covered here, France, Germany, Italy, and Spain the share of asset-based lending is even smaller than the U.S. on average. In particular, in the French case as the main European economy with a meaningful corporate credit boom, the potentially dangerous feedback loops between asset price declines and deleveraging pressures look contained. We should, however, be cautious not to draw far-reaching conclusions as the data only cover public firms and coverage outside of the U.S. is incomplete. Recent work by Ivashina, Laeven and Moral-Benito (2020) shows that the distinction between both types of lending is important for the bank lending channel of monetary policy.

Table 1 Share of total non-financial business debt by type, 2013-2018

Countries	Asset-Based	Cash Flow-Based
France	9.0%	77.9%
Germany	10.7%	73.0%
Italy	12.5%	67.7%
Spain	15.2%	64.0%
United Kingdom	17.6%	68.9%
United States	19.0%	79.5%

Notes: Figures taken from Kermani and Ma (2019). Five-year average over 2013 to 2018.

3.2 Caveat 2: debt reorganization frictions matter

My second caveat regards the efficiency and cost of debt reorganization frameworks for insolvent firms. Such frictions take centre stage in our recent work in which we show that the ease of debt reorganization regimes plays an important role in determining the economic costs of corporate debt booms (Jordà, Kornejew, Schularick, and Taylor 2020). In related work on the micro level, Adalet McGowan and Andrews (2018) explore the link between insolvency

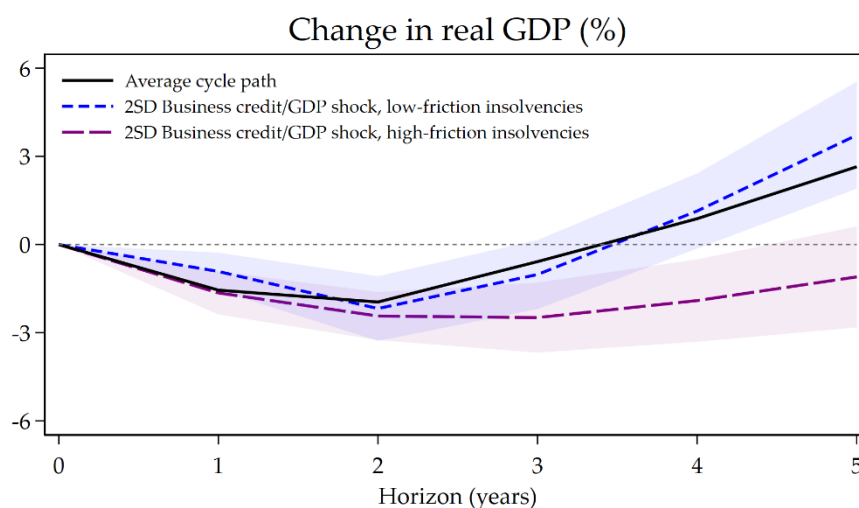
regimes and firms' multi-factor productivity growth and introduce new indicators of the design of insolvency regimes.

The fundamental insight here is that the aftermath of corporate credit booms is shaped in important ways by the legal infrastructure, in particular by the presence of processes allowing for efficient debt reorganization in insolvency. Such institutions appear crucial to prevent corporate debt overhang following a corporate credit boom to take a toll on the macroeconomy. Put simply, the costlier it is to restructure the bad debts incurred during the boom and the longer it takes, the worse the macroeconomic fall-out of the lending boom becomes.

This key result is shown in Figure 11 that resembles the impulse responses shown earlier, but introduces an interaction between debt growth and the quality of the bankruptcy regime. To measure the characteristics of these legal procedures we draw on the creditor rights indicator of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) expanded by Djankov, McLiesh, and Shleifer (2007). Strong protection of creditor claims reduces the possibility that firm owners can withhold assets in bankruptcy, which would weaken owner's incentives to negotiate a restructuring. Mueller (2021) also points to a link between the efficiency of bankruptcy proceedings and recovery values.

Figure 11 shows that recessions that occur after corporate credit booms become much more severe if the bankruptcy regime is weak. Firm-level analysis corroborates that reforms to insolvency regimes that lower barriers to corporate restructuring are associated with higher productivity growth of firms (Adalet McGowan, Andrews, and Millot 2018). In low-cost and efficient debt reorganization regimes, corporate credit booms leave no meaningful traces on business cycle dynamics. We are back to the baseline case that corporate lending booms blow over.

Figure 13 Recessions, business credit booms and legal frictions to bankruptcy

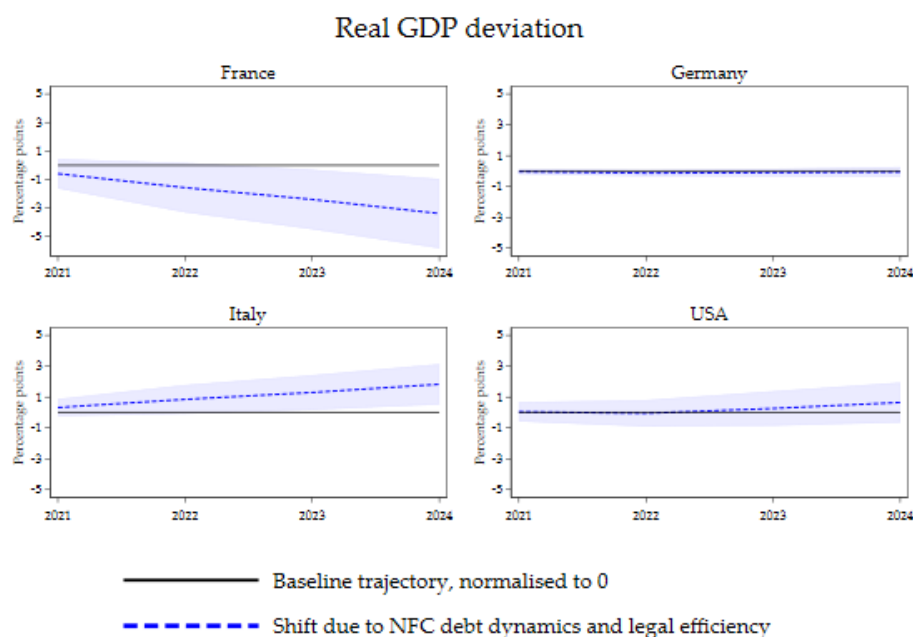


Notes: Reproduced from Jordà, Kornejew, Schularick and Taylor (2020). Predicted recession paths after quinquennial credit/GDP booms of 2-standard-deviation above the long-term mean. Shaded area mark 90% confidence intervals. Estimations based on a sample of 18 advanced economies over the time span 1978-2019.

Some progress has been made in Europe to harmonize bankruptcy processes and streamline the implementation, but a lot remains to be done (Becker 2019). Adalet McGowan, Andrews and Millot (2016) show that insolvency regimes vary significantly across countries along dimensions such as personal costs to failed entrepreneurs and barriers to restructuring. For instance, in some countries creditors are unable to initiate restructuring and no priority is given to new financing over unsecured creditors. Anecdotal evidence also suggest that complex companies are opting for the U.S. bankruptcy system owing to the better protection it offers from messy liquidations (Gilson 2012).

While the measurement of legal institutions and processes always comes with a considerable degree of uncertainty, we can use the available data and combine them with the impulse responses from the estimations in Jordà, Kornejew, Schularick and Taylor (2020) to make a forecast. We will get a sense to what extent the interaction of country-level corporate credit trends and debt reorganization frictions could weigh on the economic recovery. Figure 12 shows the results and underscores that some risks exist for France, whereas the other countries see no negative deviations from the baseline path. In the U.S. and Germany, the forecasts for the recovery speed remains virtually unchanged.

Figure 14 Shift in recovery paths due to business credit and legal frictions



Notes: Based in estimates of Jordà, Kornejew, Schularick and Taylor (2020) presented in Figure 10 and sectoral credit data sourced from national central banks. Shaded areas mark 95% confidence interval.

3.3 Caveat 3: banks and zombies

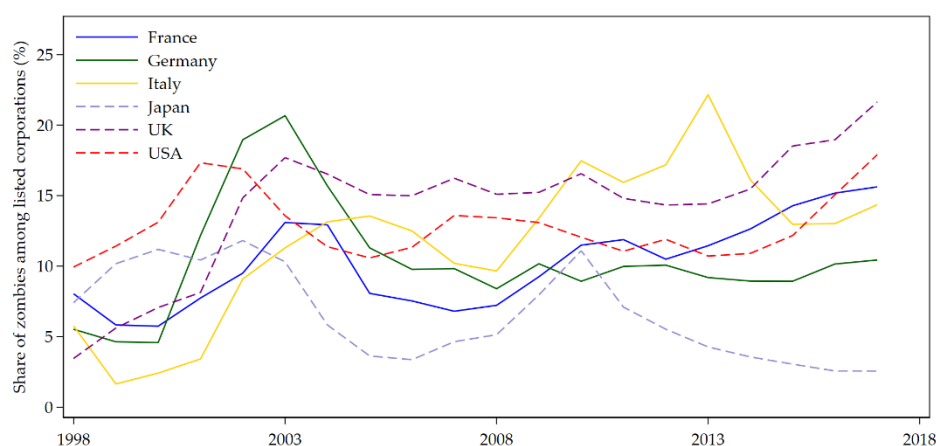
The third caveat relates to a favourite conversation topic of financial economists: the rise of undead zombie firms that roam past their due date and suck the life blood out of healthy companies and even the banking sector. Just like other zombies, their existence is somewhat

debated, but interest in their life cycle and survival rates has picked up again in recent years. Are zombies on the march?

In a well-known paper, Adalet McGowan, Andrews, and Millot (2018) study zombification and its link to capital allocation and productivity trends – a theme that also featured prominently in Gopinath, Kalemli-Özcan, Karabarbounis and Villegas-Sanchez (2017). Banerjee and Hofmann (2018) use firm-level data on listed non-financial companies in 14 advanced economies and show a rise in the share of zombie firms. In their definition (which I follow here), zombie firms are unprofitable firms with an interest coverage ratio below 1 that also have a low stock market valuation.

The share of such firms has nearly quadrupled from 4% of the stock market universe in the late 1980s to 15% in 2017. Figure 13 shows that zombie companies, in the definition of Banerjee and Hofmann (2018) and using their data have been on the rise in some countries, especially in the U.S. and the UK. On a sectoral level, zombies appear to be concentrated in the mining and energy sectors. The paper also shows that the zombie share has not declined after the initial rise in the global financial crisis, raising fears that the low interest environment has allowed unprofitable companies to survive longer than they should.

Figure 15 Share of corporate zombies



Notes: Reproduced from Banerjee and Hofmann (2020). Share of publicly listed corporations defined as “zombie firm” due to insufficient earnings to cover interest rate expenses and low stock market valuation.

My third major caveat to the view that corporate lending booms do not leave major traces on business cycle dynamics relates to the creation and survival of such zombies. Macro evidence exists that suggests that corporate debt booms can turn into a macro problem if such booms are accompanied by slow loss recognition and ever-greening of loans. One might call this the Japanese scenario: situations in which an overly indebted corporate sector, instead of reorganizing the debt or liquidating the firm, is thrown an artificial life line by weak banks that do not want to book the loss (Caballero, Hoshi and Kashyap 2008).

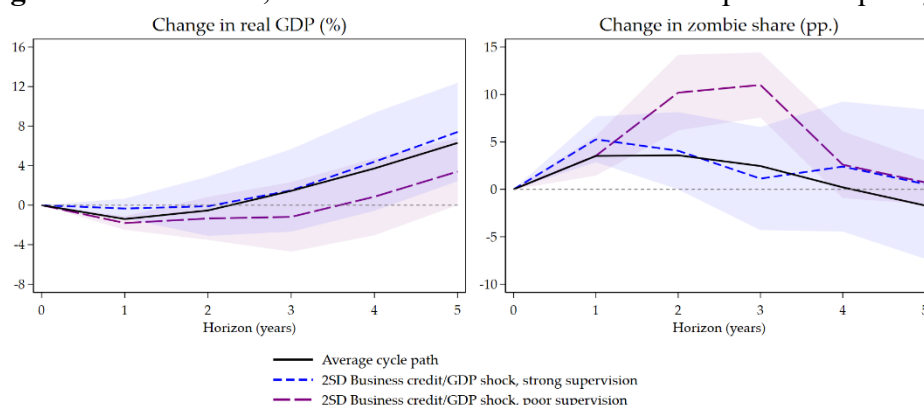
There are different motives why banks might want to do this. The necessary condition is that they are badly supervised so they can actually get away with it. The sufficient condition is that they have an incentive to do it. That incentive typically consists in insufficient capital to account for the losses, or opaque connections to the company in question. But not only weak

banks can lead to zombie creation and survival. Liquidation and reorganization frictions discussed earlier can also substantially increase the population of zombie firms. Note, however, that there also is a bright side to throwing life-lines to companies in trouble, provided the companies are only temporarily impaired. Liquidity provision to firms in distress avoids disruptions of supply chains, labor market matches are preserved and solvent companies can continue their operations (Gagnon 2020; Gourinchas, Kalemli-Ozcan, Penciakova, and Sander 2020).

Figure 14 combines an index for the quality of banking supervision from Abiad, Detragiache and Tressel (2010) that spans the decades from the 1970s until the global financial crises with credit and macro data from the Macrohistory Database (Jordà, Schularick and Taylor 2017). The local projections trace the effects of corporate lending booms in weak (strong) banking supervision regimes on output. Owing to the smaller sample size, the effects are not as precisely estimated as in the case of bankruptcy frictions, but the estimates also point to sizeable macro after-effects of corporate debt overhang when banks are weakly supervised. Three years after the onset of the recession, the output path in weak supervisory regimes is more than 2pp lower compared to the strong supervisory regime.

The panel on the right investigates a potential mechanism: the emergence and survival of zombie companies (using the Banerjee and Hofmann (2021) definition of zombie companies and their data). The share of unprofitable companies with low stock market valuations (relative to the median) increases in all recessions as companies suffer losses. In normal recessions, however, the zombie company share peaks after about 1 year and then declines. The same path can be observed after a large corporate credit expansion provided that the banking supervisory environment is strong. In poor supervisory environment, the zombie share continues to rise as companies do not exit. The peak is reached after three years, matching the much more severe GDP drag on the left hand side.

Figure 16 Recessions, business credit booms and bank supervision quality



Notes: Based on Jordà, Kornejew, Schularick and Taylor (2020). Index of bank supervision quality from Abiad, Detragiache, and Tressel (2010). Data on zombie shares obtained from Banerjee and Hofmann (2021). Predicted recession paths after quinquennial credit/GDP booms of 2-standard-deviation above the long-term mean. Predictions for real GDP on the left, for the share corporate zombies on the right. Shaded area mark 90% confidence intervals. Estimates on the left based on a sample of 18 advanced economies over the time span 1973-2005. Estimates on the right based on a sample of 14 advanced economies over the time span 1978-2005.

What do these results imply for the future? Banking supervision has clearly improved since the global financial crisis and capital buffers have grown. Both the Eurozone and the U.S.

today can be considered a strong supervisory regime in the spirit of the index by Abiad, Detragiache and Tressel (2010). Taken at face value, this would mean that there is little to fear from the corporate debt increase. With appropriate supervision and loss recognition, there is no reason to expect a drag on the recovery.

However, a number of recent papers have reported ongoing zombie sightings in Europe even before the pandemic. Storz, Koetter, Setzer and Westphal (2017) and Andrews and Petroulakis (2019) have studied the zombie firm-weak bank nexus in the Eurozone and found some evidence that financially weak banks are more likely to be associated with zombie firms, albeit causality obviously can run in both ways. Acharya, Crosignani, Eisert, and Eufinger (2020) come to similar conclusion that zombie linkages between firms and banks are not necessarily a thing of the past in Europe.

In light of this evidence, of all the caveats out there, the persistent doubts about the balance sheet health of parts of the European banking system are likely the clearest and most prominent threat to a smooth workout of corporate debt. While the capital position of many European banks has improved, it is not hard to arrive at substantial numbers for a potential capital shortfall under conservative assumptions (Schularick and Steffen 2020). In this sense, the Covid-pandemic also presents an opportunity to use credible stress tests and precautionary recapitalization to finally leave behind the spectre of the global financial crisis that haunted the European financial system for a decade and learn the key lessons of the past decade with respect to capitalization and growth (Acharya and Steffen 2020; Jordà, Richter, Schularick and Taylor 2021).

4 Implications for monetary policy

What are the broader implications of these findings for monetary policy going forward? To start with, the typically benign aftermath of corporate debt booms means that fears of major post-pandemic headwinds to growth caused by corporate debt overhang – comparable to the post-2008 household debt overhang – are likely unfounded. Many uncertainties remain with respect to the evolution of the virus and the efficacy of protection. But at this juncture, corporate debt overhang does not seem like a likely reason why our forecasts for the recovery speed from the pandemic could turn out to be too optimistic.

A related and much-debated question is whether accommodative monetary policy itself creates or at least throws a life-line to the debt-ridden corporates that suck the lifeblood of healthy firms by crowding out investment. Such fears are regularly voiced on both sides of the Atlantic (Economist 2020). Banerjee and Hofmann (2018) also find that, controlling for other factors, lower interest rates are associated with a higher number of zombie companies as cheap loans potentially keep unsustainable businesses alive for longer.

On closer inspection, arguments linking monetary policy to zombie creation and sluggish productivity growth appear less convincing – and may even have the causality upside down. First, as noted above it is still not clear that zombie firms are actually on the rise. Figure 15 above shows heterogeneous trends across European countries. These findings are echoed in studies for the U.S. Favara, Minoiu, and Perez-Orive (2021) find little evidence that zombie firms are on the rise in the U.S. or benefited disproportionately from monetary policy support.

Second, the fact that zombie company shares vary across countries and along the time path is itself an argument against a dominant role for a single factor such as interest rates in driving the trend and speaks to the importance of other factors. The decline in interest rates has been a common phenomenon across countries while zombie share differ substantially. A prominent example is the Eurozone where countries have similar financing conditions in financial markets but heterogeneous trends zombie shares. Moreover, the often-debated link between monetary policy and zombie creation fails to differentiate between monetary policy per se and the fall in the natural rate of interest (r^*) that has taken place in recent decades. The drivers of this decline likely include growing inequality, demography and safe-asset accumulation by emerging markets. Monetary policy itself is not the cause for structurally lower natural rates.

Last and most importantly, recent research shows that aggregate demand conditions are paramount for the success of start-ups and firm formation (Ignaszak and Sedlacek 2021). The micro evidence suggests that firm-level survival and growth are to a large extent demand-driven. To the extent that monetary policy creates the demand conditions conducive to firm growth, it supports and accelerates structural change instead of preventing it. These new insights therefore rebuke arguments that a higher interest would deprive zombie firms of access to cheap credit, improve capital allocation and lead to higher growth. A strong demand and supportive policies promote firm growth and structural change.

5 Conclusion

Corporate debt has increased sharply in many countries both before and during the Covid-recession. Against the background of widespread concerns that this debt build-up will turn into a macroeconomic burden, this paper revisited the evidence on the macroeconomic after-effects of corporate debt booms.

The bottom-line is straight forward. Corporate indebtedness and debt overhang problems in the corporate sector are often conjured as key risks for a quick rebound from the pandemic, but recent insights from macro-financial research do not raise alarm bells. The literature makes a clear distinction between the aftermath of household credit booms – which tend to be costly (Jordà, Schularick and Taylor 2013; Mian, Sufi and Verner 2017) – and corporate credit booms that are not systematically associated with subpar economic outcomes.

Recent research has also pointed to three major caveats to this view that I discuss in the context of the current situation. First, the sectoral composition of the credit boom matters (Mueller and Verner 2021). Studying at sectoral lending data, I did not find “smoking gun” evidence that the major advanced economies were caught in an unsustainable non-tradable credit boom.

Second, recent research has emphasized that the aftermath of corporate lending booms is shaped in an important way by the quality of the institutional framework governing corporate debt reorganization. If the processes in place are subpar and swift restructuring is impeded, corporate debt overhang becomes costly for the macroeconomy. It is clearly too early to give the all clear on this account, but at this stage, it happens to be the case that those economies with less efficient bankruptcy frameworks are also those whose corporate sectors deleveraged in the past decade – while the booming economies tend to be those where institutions work quite efficiently. This being said, the importance of debt reorganization institutions can hardly be overestimated. The implementation of efficient bankruptcy regimes is an important

prerequisite to deal with corporate debt problems if and where they exist. A policy priority in the coming years should consist in providing the frameworks for efficient corporate debt reorganization.

Third and potentially most importantly, I discuss the evidence that weakly capitalized or weakly supervised banking systems “ever-green” bad loans, preventing the exit of impaired businesses and depressing productivity growth. More than a decade after the global financial crisis, clearly some risks persist on this account, particularly in Europe. Stringent supervision as well as precautionary recapitalizations following credible stress-tests are the best policy options to deal with such risks.

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