

Stylised facts on debt and financial crisis



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This policy note summarizes the main empirical findings on the role of debt in financial crisis. Credit booms – on mortgage debt, debt to the non-tradable sector, asset price bubbles fueled by credit, and public debt booms – are often followed by economic underperformance and/or financial crisis. Costs of financial crisis – in terms of fiscal costs, output losses, and increase in non-performing loans – are larger than the costs of normal crisis and tend to be higher if the fiscal space is low. Public and private debt increase in the aftermath of global recessions and after reaching high levels tend to constitute a drag on GDP growth. Credit booms change the characteristics of the business cycle and tend to exhibit international synchronization.

¹ This policy brief should not be reported as representing the views of Banco de Portugal. The views, opinions and conclusions expressed in this policy note are those of the author and do not necessarily reflect those of Banco de Portugal or the Eurosystem. Pedro Duarte Neves is Associate at the Systemic Risk Centre, London School of Economics.

Introduction

The interest about the relation of debt and the macroeconomy has sparked since the Great Financial Crisis and has attracted a large amount of attention amongst policymakers, supervisory authorities, academics and the public in general. The relevance of debt accumulation for the economy is today more important than ever, as global debt – public and private, in advanced economies (AEs) and in emerging market and developing economies (EMDEs) – is at all-time highs. This policy note draws on 20 papers published over the last decade to review the key empirical findings on the role of debt in financial crisis.

Debt and financial crisis: the main empirical findings

This Policy Note summarizes the key empirical findings on the role of debt in financial crisis on the following 12 stylized facts.

Fact 1: Private credit booms culminate many times in either economic underperformance or financial crisis

Dell’Ariccia et al (2012), drawing on a large sample of AEs and EMDEs, concluded that about one in three credit booms has been followed by a financial crisis within three years of its end. They used bank credit as the reference variable, which almost exclusively corresponds to private debt. Koh et al (2020), drawing on a large sample of EMDEs, concluded that around 40% of the identified periods of rapid private debt accumulation were associated with financial crisis.

Credit booms tend also to be associated with periods of prolonged subdued growth. Dell’Ariccia et al (2012) concluded that three out of five credit booms culminated in extended periods of subdued economic growth. Jordà et al (2013a) also show, for a sample of AEs, that private leveraged booms tend to be followed by slower recoveries, in terms of GDP growth, investment spending and credit growth. Verner (2019) shows that private debt booms are good predictors of GDP slowdown.

It is also the case that the intensity of the credit boom increases the likelihood as well as the adversity of unfavorable outcomes. Dell’Ariccia et al (2012) show that credit booms that start at higher levels of leverage are more likely to end badly, that meaning a financial crisis and/or a period of subdued growth. Jordà et al (2013a) conclude that the intensity of leveraging is statistically associated with the adversity of the post-boom period.

Credit booms are different from financial deepening, which is not associated with disruptive outcomes. Credit booms are most of the times driven by an expansion in credit supply, in a context of declining credit spreads and riskier borrowers reflecting an increasing willingness to lend. They tend to fuel asset prices (housing in particular) and a reallocation of credit towards the non-tradable sector (construction in most cases). Finally, they leave in their wake private debt overhang and banking sector distress.

Fact 2: Mortgage debt booms are often bad booms: the aftermath of household debt booms is often marked by prolonged recessions and slow recoveries

There is a trade-off between the short-term benefits of rising household debt to the real growth of the economy and its medium term costs in terms of growth slowdown and possible macroeconomic and financial instability. Mian et al (2017) assess the relation between household debt and the business cycle, drawing on a sample of AEs. They conclude that an increase in the household debt to GDP ratio induces a temporary boost in GDP but subsequently is associated with lower GDP and higher unemployment in the medium run.

Dell’Ariccia et al (2012) have concluded that mortgage credit growth predicts financial crisis and, conditional on having a recession, stronger credit growth predicts deeper recessions. Valckx et al (2017) have also concluded that higher growth in household debt is associated with a greater probability of financial crisis and this relation becomes stronger when household debt is higher. Finally, Greenwood et al (2020) concluded that the probability of a crisis increases considerably when both household credit and home prices rise significantly.

Fact 3: The sectoral composition of a corporate debt boom is associated with the likelihood of a future financial crisis: construction booms typically do not end well

Dell’Ariccia et al (2020) and Müller and Verner (2021) took a remarkable step ahead in the study of the relation between private debt and financial crisis. They developed datasets, for AEs and EMDEs, with the sectoral allocation of private credit and concluded that this allocation helps in the distinction between good and bad booms. Müller and Verner (2021) show that when the credit boom is predominantly lending to households and to the non-tradable sector – including construction and real estate – it is more likely an unsustainable demand boom. The misallocation of resources across sectors results in productivity slowdowns and impairs future growth. Tradable sector credit expansions do not tend to bring risks for financial stability.

Dell’Ariccia et al (2020) provide similar results. Using disaggregated data on output they conclude that not all booms are alike: long lasting credit booms with rapid construction growth typically do not end well. Several features of the study are worth mentioning. Construction is the only sector that consistently grows more in bad booms than in good booms (in terms of output and employment); the expansion of the construction sector is a good predictor of the type of the boom (good or bad); construction sector activity is a better predictor of bad booms than household debt. These results hold for AEs and for EMDEs, are robust to the sample period (including or not the Great Financial Crisis), and have statistical significance even after the inclusion of the usual predictors.

Fact 4: Private credit booms matched by asset bubbles (in housing or equity markets) increase the likelihood of a financial crisis

Jordà et al (2015) assess the nexus between credit, asset prices and economic outcomes, drawing on a sample AEs. They show that asset price bubbles when fueled by credit booms – the *leveraged bubbles* – increase the likelihood of a financial crisis and tend to be followed by deeper and longer recessions. Leveraged housing bubbles – that is housing prices deviating from fundamentals fueled by mortgage credit booms – are a particularly harmful combination and tend to be followed by financial distress and deeper recessions.

Greenwood et al (2020), drawing on a sample of AEs and EMDEs, conclude that both nonfinancial business and household credit growth have some predictive power of a future crisis: the degree of predictability increases significantly when either corporate borrowing *and* stock market indexes, or household borrowing *and* housing prices, rise strongly. The combination of rapid credit and asset price growth over the past three years – either in the household or in the corporate sector – predicts a 40 per cent probability of starting a financial crisis within the next three years. The occurrence of simultaneous business and household credit booms tend to be particularly damaging.

Fact 5: Public debt booms are also associated with financial crisis, more frequently so in EMDEs

The previous stylized facts concerned private debt booms. It exists as well extensive evidence on the association between public debt booms and following episodes of financial crisis. Kose et al (2020) analyze episodes of rapid debt accumulation in EMDEs, being as frequent episodes of government debt accumulation as episodes of private

debt accumulation. About half of these debt accumulation episodes were followed by a financial crisis. The frequency of a financial crisis following a public debt accumulation episode exceeded by 14 percentage points the corresponding frequency for private debt accumulation episodes. Financial crisis featuring larger output losses were associated more frequently with government debt accumulation episodes than with private debt ones. Simultaneous episodes of public and private debt accumulation tend to be followed by more severe financial crisis, with larger reductions in GDP and investment.

Jordà et al (2013b) conclude that, in the case of AEs, risks to financial stability have more frequently originated in the private sector than in the public sector. Private-sector borrowing – and not public debt – played a central role in most episodes of financial instability. They claim that this result is in line with the Global Financial Crisis, as AEs did not have high public debt levels on the onset of that crisis.

Fact 6: Fiscal space matters, as higher levels of public debt are associated with longer periods of economic underperformance and larger costs of financial crisis

Fiscal space corresponds to the room available to accommodate public debt increases – reflecting the use of fiscal policy to stimulate the economy following an unexpected exogenous shock or to face the costs of a large intervention in the financial system – before raising issues of debt sustainability. Fiscal space is not a static concept: it varies with market and economic conditions (in particular with the growth rate of the economy and the cost of the public debt). Fiscal space is therefore very helpful when a financial crisis materializes.

Jordà et al (2013b) conclude, for a sample of AEs, that high levels of public debt have tended to exacerbate the effects of private sector deleveraging, as they were associated with a more prolonged period of economic underperformance and larger economic costs. High levels of public debt constitute a drag on a recovery in the aftermath of a private sector credit boom, as they reduce the ability to use fiscal policy to alleviate the downturn. The authors suggest that high public debt levels reduce the capacity of fiscal policy to provide counter-cyclical stimulus to the economy and, on the other, increase the likelihood of a ‘doom loop’ between the sovereign and the banking sector.

Fact 7: Total (public and private) indebtedness tends to increase sizably in the aftermath of global recessions

Kose et al (2021) provide a very comprehensive analysis of the evolution of debt following the past global recessions of 1975, 1982, 1991 and 2009. They conclude that debt – public and private, in AEs and in EMDEs – tends to increase after global recessions. Debt increases in the aftermath of global recessions were higher for government debt in AEs (16 p.p. of GDP in average), intermediate for private debt and public debt in EMDEs (12,5 and 9,5 p.p. respectively), and lower for private debt in AEs (3,5 p.p. of GDP). As a result, total non-financial debt tends to exceed by around 20 p.p. the level prevailing before the global recession.

This result illustrates that previous global recessions had a ‘cost’ in terms of non-financial debt: in spite of the post-recession rebound in growth, total non-financial debt, as percentage of GDP, increased sizably in the aftermath of a global crisis. Borio et al (2016) present three reasons why private sector financial booms leading to financial distress may determine a marked rise in post-crisis public debt: costs associated with the repair of the banking sector, direct effects in the budget, and, finally, permanent losses in potential output (if sizeable misallocation effects materialized during the financial boom).

Fact 8: Most financial crisis lead to an inverse U-shaped pattern of non-performing loans

Ari et al (2020), drawing on a sample of AEs and EMDEs, describe the evolution of non-performing loans (NPLs) in the follow-up of a banking crisis. They show that NPLs tend to start from reduced levels, rise rapidly in the initial stages of the financial crisis, and peak some years later (inverse U-shaped pattern). NPLs are higher and more volatile during banking crisis than in normal times. Pre-crisis NPLs are not a good indicator of its future evolution. Finally, they also show that the amount of peak non-performing loans is associated with the strength of the post-crisis recovery: higher unresolved NPLs are associated with more severe post-crisis recessions, characterized by a more depressed GDP and slower economic recovery.

Previously, Laeven and Valencia (2013) have presented evidence on the dynamics of NPLs in the follow-up of banking crisis. The peak of the NPLs, as indicated by the median, achieved 30-35 percent of total loans in EMDEs and 5 per cent in AEs. Ari et al (2020) obtained the same result: when compared with EMDEs, AEs tend to have lower post-crisis NPLs but, somewhat surprising, they take longer to resolve them.

Fact 9: Financial crisis recessions are costlier than normal recessions in terms of lost output

Jordà et al (2013a), using data for AEs, conclude that financial crisis recessions are costlier than typical recessions: real GDP per capita, after 5 years, is about 5% lower in financial crisis than in a normal recession. They show that financial crisis recessions tend to be deeper and longer than normal recessions (as '*credit bites back*'). Koh et al (2020), using data for EMDEs, show that after 8 years of episodes of rapid private and public debt accumulation, GDP and GDP per capita were around 6 to 10% lower in crisis episodes, with public debt accumulation cases featuring larger output losses.

Laeven and Valencia (2013) illustrate another frequent feature in the follow-up of financial crisis, drawing on a large sample of AEs and EMDEs. Unlike what happens in normal crisis, it is common that after a financial crisis there is a permanent loss of GDP, as the trend GDP prevailing before the crisis is not achieved after the crisis. This result – which suggests that financial crisis leave a permanent cost – has been patent in many AEs in the aftermath of the Great Recession. They provide evidence on the 10 costliest banking crisis in their sample: quite strikingly for all of them output losses were at or in excess of 100 per cent of GDP and the increases in public debt have exceeded 60 per cent of GDP.

Fact 10: The increase in private indebtedness changes the characteristics of the business cycles

Jordà et al (2017), drawing on a sample of AEs, show that the pronounced increase in nonfinancial private debt since the 70s – which graphically has the shape of a '*hockey stick*' – affected the characteristics of the business cycle in three dimensions. The four moments of the main macroeconomic aggregates (rates of growth, volatility, skewness, and tail events), the correlations of the main macroeconomic aggregates with credit, and finally the correlations between macroeconomic aggregates of different countries depend all on the ratio of nonfinancial credit to GDP. The unprecedented shift in private debt relative to GDP has changed the main features of the business cycles.

Fact 11: Credit booms tend to exhibit some international synchronization

One additional aspect that is frequent in empirical studies is the importance of the international synchronization of credit booms. This result holds for both AEs and EMDEs. Greenwood et al (2020) find that private credit booms have a global component across countries, which helps in the identification of future crisis. On the same vein,

Laeven and Valencia (2013) conclude that banking crisis occur in waves: during the 90s three clusters of crisis in the transition economies, in Latin America (Tequilla crisis) and in East Asia (Asian financial crisis); in 2007 and 2008 the Great Financial Crisis brought a considerably high number of banking crisis.

Fact 12: High debt is a drag on growth

Borrowing creates vulnerabilities. Higher household debt means a higher cost service of the debt and higher sensitivity to interest rate changes. Higher corporate debt also means a higher cost service of the debt and, as the maturity of the loans is typically much lower, a higher dependence on market conditions when it is necessary to renew debt instruments. Rising non-financial private debt brings risks to financial stability and makes financial crisis more likely. In addition, it also impairs growth, as a higher proportion of income has to be dedicated to service the debt. On the same vein, higher levels of public debt carry a high debt load and constrain possible counter-cyclical fiscal policy.

Morganti (2022) used a sample of AEs and EMDEs to conclude that private debt (household debt and nonfinancial corporate sector debt) is negatively related to economic growth and is positively related with growth volatility. Higher levels of public debt are associated with reduced GDP growth in EMDEs and with higher growth volatility in AEs.

Many studies provide estimates for thresholds after which debt becomes a drag on GDP growth, that is above which financial depth no longer has a positive effect on economic growth. Using a sample of OECD countries, Cecchetti et al (2011) obtained estimates of 90 per cent of GDP for corporate debt, 85 per cent for household debt (although the impact is imprecisely estimated), and around 85 per cent for government debt. Lombardi et al (2017), using a sample of AEs and EMDEs, obtain an estimated threshold of 80 per cent of GDP for household debt. Arcand et al (2015) conclude that financial depth starts to have a negative effect on output growth when credit to the private sector reaches 80-120% of GDP. These thresholds are merely indicative and one should not expect to find universal thresholds common for all countries. Moreover, the available estimates do not incorporate the effects of the current (very) low interest rate environment.

Conclusions

Indebtedness levels – public and private, in AEs and in EMDEs – reached all-time highs. The relevance of debt accumulation for macroeconomic stability is well-established in the economic literature: indebtedness booms are very often followed by economic underperformance and/or financial crisis. It is however important to recall that current economic conditions differ markedly from the past: interest rates are at (or close to) all-time lows, debt service ratios are at low levels, and the macroprudential framework progressed significantly since the Great Financial Crisis. ■

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