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Article — Published Version

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Applied Economics

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Suggested Citation: Ademmer, Martin; Jannsen, Nils (2018) : Post-crisis business investment in the euro area and the role of monetary policy, Applied Economics, ISSN 0003-6846, Taylor & Francis, Abingdon, Vol. 50, Iss. 34-35, pp. 3787–3797-, <https://doi.org/10.1080/00036846.2018.1436147>

This Version is available at:

<https://hdl.handle.net/10419/180839>

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Post-crisis business investment in the euro area and the role of monetary policy

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ABSTRACT

Business investment in the euro area strongly declined during the Global Financial Crisis and the Sovereign Debt Crisis. It has not yet rebounded to its pre-crisis trend despite the very expansionary monetary policy measures of the ECB. We analyse the sluggish recovery in business investment in the euro area and the role of monetary policy in three steps. We investigate the main factors that have impeded business investment since the Global Financial Crisis. We empirically analyse how business investment has developed compared to typical patterns during other financial crises. Based on these results, we then discuss how effective monetary policy has been in stimulating business investment since the Global Financial Crisis. We conclude that business investment in the euro area has developed broadly in line with typical post-crisis patterns. Monetary policy significantly contributed to stabilize business investment at the beginning of the crises. In the aftermath of the crises, however, there seems to be little scope for monetary policy to further stimulate investment.

KEYWORDS

Business investment; crisis; monetary policy; local projections

JEL CLASSIFICATION

E22; E32; E52; C32

I. Introduction¹

Business investment in the euro area strongly declined during the Global Financial Crisis and the Sovereign Debt Crisis. Since then, it has shown only few signs of rebounding towards its pre-crisis trend despite the very expansionary and unconventional monetary policy measures of the ECB. Business investment is not only a key driver of economic activity but also a key driver of the long-run growth perspective since it determines the capital stock that is available for future production. Given the high relevance of business investment for economic prosperity, the questions of why business investment is relatively weak and to what extent it can be stimulated by monetary policy have attracted much attention of policy makers. However, direct evidence on these important questions is still scarce. In this article, we aim at addressing these questions by combining results from different strands of the literature and by complementing these results with own empirical investigations.

Our analysis of post-crisis business investment in the euro area and the role of monetary policy proceeds in three steps. First, we investigate the main factors that have impeded business investment since

the Global Financial Crisis and detect those that are still relevant in the euro area at the current juncture. Second, starting from previous evidence on the impact of crises on real GDP, we compare the recent path of business investment in the euro area to typical historical patterns following other financial crises. We estimate these typical patterns of business investment based on a panel of 22 advanced economies over the period 1970–2015 using local projections. Moreover, given the high relevance of overall economic activity for business investment via accelerator effects, we also provide empirical evidence for the business investment–GDP ratio. Third, drawing on the most recent literature, we discuss the role of monetary policy for business investment in the euro area since the Global Financial Crisis. In particular, we discuss the potential impact of monetary policy on the main impediments of business investment in the euro area with a specific focus on the effectiveness of monetary policy during and in the aftermath of financial crises.

Based on this analysis, we argue that low economic activity constitutes the most important factor behind weak business investment in the euro area. Historical experiences suggest that financial

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¹This article is based on a Briefing Paper that was prepared for the Committee on Economic and Monetary Affairs of the European Parliament (ECON) as an input for the Monetary Dialogue of June 2016 between ECON and the European Central Bank (Jannsen and Plödt 2016).

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crises are usually associated with persistent declines in economic activity. This indicates that also business investment will remain weak relative to its pre-crisis trend as long as accelerator mechanisms apply. The results from our empirical approach indeed show that business investment has by and large developed in line with what could have been expected based on typical post-crisis patterns. The occurrence of the second crisis, the Sovereign Debt Crisis, might largely explain why business investment is somewhat below the typical path. During each of the two financial crises business investment in the euro area has actually performed relatively well compared to typical post-crisis patterns. Given that economic policies, including monetary policy, were not systematically wrong during other financial crises, historical evidence suggests that currently monetary policy can only be of little help to further stimulate business investment in the euro area. This argument is supported by studies that analyse the effectiveness of monetary policy during and in the aftermath of financial crises: Monetary policy seems to be very effective in stabilizing the economy at the height of a crisis (e.g. by reducing uncertainty and restoring confidence). By contrast, monetary policy seems to be less effective in the aftermath of a crisis since adjustment processes in the economy (e.g. deleveraging) harm important transmission channels.

The remainder of this article is structured as follows. In [Section II](#), we briefly describe the drivers of business investment from a theoretical perspective and the transmission channels through which monetary policy can stimulate investment. In [Section III](#), we discuss the main factors holding back business investment since the Global Financial Crisis and provide evidence of how these factors have recently developed in the euro area. In [Section IV](#), we analyse typical patterns in the aftermath of financial crises and check how the actual path of business investment in the euro area relates to these patterns. In [Section V](#), we discuss the literature on how effective monetary policy generally is in stimulating economic activity during and in the aftermath of financial crises and draw conclusions for the current situation in the euro area. In [Section VI](#), we summarize our results and

briefly discuss the implications for the prospects of business investment in the euro area.

II. Drivers of business investment and the role of monetary policy: theoretical considerations

Investment dynamics are driven by multiple factors. Early models highlight the effect of output growth on investment (the so-called ‘accelerator models’, see Clark 1917). However, to what extent business investment increases in response to changes in economic activity also depends on several other factors, such as the rate of capacity utilization, expectations of future demand, and the level of economic uncertainty. Firms are more likely to invest if capacity utilization is high and they are less likely to invest if there is excess capacity. Since firms consider potential future sales when they make investment decisions, low expectations of demand in the next months or years could become a major impediment of business investment. Related, high levels of uncertainty with respect to future output or potential policy changes might impede or postpone investment activity because firms unable to gauge future developments are induced to take a wait-and-see strategy (see, amongst others, Bloom 2009; Julio and Yook 2012; EIB 2013).

The ‘neoclassical model of investment’ highlights the role of the cost of capital, in addition to output growth, for determining the level of investment (Jorgenson 1971). Accordingly, a decrease in the interest rate and, hence, a decline in the cost of capital makes a greater number of potential investments profitable. The well-known Tobin’s q measure, which is related to the neoclassical model (Hayashi 1982), stresses the link between investment decisions and stock price movements. Following this theory, a firm is encouraged to invest if the market value of its capital is higher than the actual replacement cost of its capital. Though often not considered in standard models, the extent of financing constraints is a further important factor of firms’ investment behaviour. Firms are prevented from making investments when they have insufficient internal funds and are unable to resort to (or have limited access to) external funds (e.g. bank loans).

Monetary policy can directly influence investment by affecting financial conditions. However, it could also influence investment indirectly, e.g. by stimulating economic activity, which in turn stimulates investment via

accelerator effects. In this regards, the theoretical literature distinguishes several transmission channels (Mishkin 1996). The different channels interact with each other and their respective timing and relative importance also depend on the specific institutional environment and the structure of an economy. The most direct channel is the interest-rate channel: *ceteris paribus*, changes in the policy rate might influence interest rates that commercial banks charge to their customers. A decrease in commercial interest rates lowers the cost of borrowing and therefore encourages investments. At the same time, a decrease in interest rates discourages saving and stimulates overall demand for goods and services. The so-called credit channel of monetary policy transmission can be divided into a bank-lending and a balance-sheet channel. According to the bank-lending channel theory, a monetary stimulus that increases bank reserves and bank deposits leads to an increase in loan supply which will have a positive effect on investment. This especially holds true for (smaller) firms that are dependent on bank loans, as other sources of external and internal finance are not available (ECB 2005). The balance-sheet channel emphasizes information asymmetries in the credit market. By improving the firms' balance sheet positions, monetary policy might be able to reduce problems related to adverse selection and moral hazard and ultimately increase lending to finance investments. Another transmission channel of monetary policy is the effect that interest rate changes and other policy measures have on the prices of various assets. Following Tobin's q , if the market value of a firm increases as stock prices rise due to an interest rate cut by the central bank, firms might be encouraged to issue new shares and use these funds to start additional investment projects. Changes in asset prices also imply wealth effects: higher stock prices might lead to greater financial wealth and eventually to stronger demand. Furthermore, monetary policy can also influence current investment decisions by providing signals about the future economic outlook (Barsky and Sims 2012) and thereby affecting firms' expectations of future demand developments and financing conditions. In a similar vein, monetary policy can help to reduce the uncertainty about the future path of the economy and thereby stimulate output growth. However, expansionary monetary policy actions not

only could raise expectations and reduce uncertainty but possibly also lower expectations and increase uncertainty, if such actions were interpreted as a sign that the economic outlook is worse than previously thought (Hubrich and Tetlow 2015).

III. Business investment dynamics since the global financial crisis and their key drivers

In this section, we first provide some stylized facts on business investment in the euro area since the Global Financial Crisis. We then review the literature on the key drivers of business investment in advanced economies, with a special focus on the euro area. Finally, we show how these key drivers have recently developed in the euro area.

III.a Stylized facts on business investment in the euro area

Unfortunately, official sources do not provide a ready-made time series for real business investment in the euro area. Therefore, we calculate a proxy for real business investment in the euro area by subtracting investment in dwellings and public investment from Gross Fixed Capital Formation (GFCF).² Accordingly, business investment in the euro area declined sharply by about 15 per cent during the Global Financial Crisis (Figure 1). After showing some signs of recovery, the euro area economy was hit by a second financial crisis (the Sovereign Debt

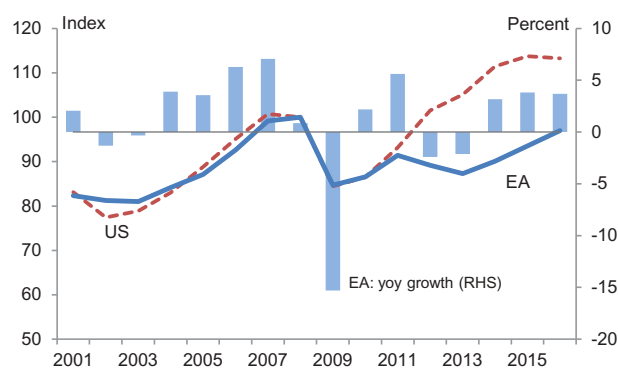


Figure 1. Business investment in the euro area and the US (2001–2016).

Annual data. Index: 2008 = 100.

²Real public investment in the euro area is computed by deflating the nominal series using the deflator for construction investment. For the year 2016, we proxy the growth rate of business investment by the growth rate of GFCF because data for dwellings and for the deflator of construction investment were not yet available at the time of writing this article.

Crisis). This crisis was associated with another recession and another decline in business investment of more than 5 per cent in 2012 and 2013. Since 2014, business investment has been growing again at relatively solid rates. The recovery is, however, widely perceived as being weak, given the strong decline that investment has undergone during the two financial crises. In 2016, business investment was still below its level of the year 2008. If business investment continues to grow at the current pace over the next years, it will not reach its pre-crisis trend. Thus, the crises would have led to a permanent decline in the level of business investment. Compared to other economies that were hit by the Global Financial Crisis, the most outstanding feature of the euro area is that it was hit by a second crisis in 2012. Before that second crisis, the recovery in business investment was broadly in line with the recoveries in other economies, such as the United States. However, business investment in the United States and other advanced economies also remained weak compared to pre-crisis trends.

III.b Key drivers of business investment since the global financial crisis

Several studies have empirically analysed the reasons behind the weak performance of investment in Europe and other advanced economies since the Global Financial Crisis. Overall, the weak performance of investment seems largely to be due to accelerator effects, meaning that sluggish economic activity has lowered the need for additional business investment and can explain the lion's share of subdued investment dynamics.

The European Commission (2015) argues that weak economic activity is a main driver of the slump in investment but also points to deleveraging pressures in the private sector. Low economic activity, as the most relevant driver holding back investment, has also been emphasized in analyses of the IMF (IMF 2015; Barkbu et al. 2015). The IMF (2015) states that only a small fraction of observed investment dynamics in a sample of advanced economies remains unexplained after controlling for changes in output. The weakness in economic activity, however, is the result of a multitude of different factors.

Several studies additionally stress the role of high uncertainty for investment decisions. Based on

evidence for the G7 economies, the BIS (2015) concludes that economic uncertainty was a significant drag on investment growth. The Deutsche Bundesbank (2016) also finds that uncertainty has a notable role in explaining investment activity in large euro area countries in the wake of the Global Financial Crisis and the European Sovereign Debt Crisis, besides real economic shocks. Since then, however, uncertainty seems to play a minor role. According to the literature, financing constraints have not been an important factor behind the weakness in business investment. Generally, financing constraints might have been a serious concern for some firms and some countries but not a major drag on aggregate business investment (EIB 2013; IMF 2015).

III.c How key drivers of business investment have developed in the euro area

Empirical studies on the main determinants of business investment in advanced economies since the Global Financial Crisis have consistently identified low economic activity as the key driver of weak business investment, with financial constraints and uncertainty also playing some role. However, these studies usually only consider the period up to 2014 or earlier and many of them are based on a panel of advanced economies. We therefore take a closer look at how these drivers have developed in the euro area.

The business survey of the European Commission on 'factors limiting production' shows that even though financial constraints are still somewhat higher compared to the period before the Global Financial Crisis, they were no important impediment during the Global Financial Crisis and the Sovereign Debt Crisis. They are also no important impediment at the current juncture (Figure 2, left). Financial constraints are broadly as important as a lack of labour supply or equipment. Currently, a lack of demand is still the most important factor, with an increasing share of firms reporting that they do not face any constraints on production at all. This evidence is supported by other evidence from business surveys. For instance, large firms in the euro area have recently reported that financial factors are the least important constraint (out of 14 possible constraints) for their investment plans (ECB 2015). The investment survey of the European Commission even indicates that financial factors are currently

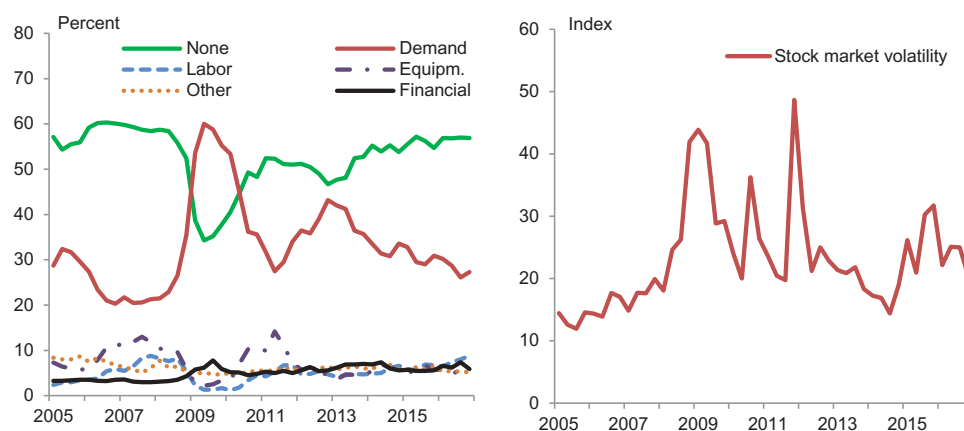


Figure 2. Factors limiting production and uncertainty (2005–2016).

Quarterly data. Left: Factors limiting production in the manufacturing sector. Shares of managers reporting individual limiting factors. Right: Stock market volatility. Volatility of the Eurostoxx 50 option traded on Eurex.

favourable (European Commission 2016). If anything, small- and medium-sized enterprises are still suffering from financial constraints in some regions. According to the ‘Survey on the Access to Finance of Enterprises in the euro area’, however, small- and medium-sized firms in the euro area report that the ‘availability of external financing’ has remarkably improved over the past years (ECB 2016a).

Several empirical studies identify uncertainty as an additional important factor holding back business investment in advanced economies. There are several dimensions of uncertainty that can be measured in different ways. For example, Baker, Bloom, and Davis (2016) measure economic policy uncertainty based on newspaper articles. Jurado, Ludvigson, and Ng (2015) measure uncertainty as the unpredictability of future economic activity. One of the most commonly used proxies for uncertainty is stock market volatility (Bloom 2009). According to this measure, uncertainty in the euro area reached record-high levels during the Global Financial Crisis in 2009 and experienced another spike during the Sovereign Debt Crisis in 2012 (Figure 2, right). Thereafter, uncertainty strongly alleviated and only temporarily went up again in the second half of 2015. Given that uncertainty is widely perceived to be only a temporary drag on investment (or economic activity), followed by a rebound once it has alleviated (Bloom 2009), and given that uncertainty has been at relatively low levels compared to acute crisis periods, it is unlikely that uncertainty still constitutes an important factor behind the weakness in business investment in the euro area.

According to most empirical studies, the crucial factor behind the weakness in business investment in advanced economies since the Global Financial Crisis is the weakness in overall economic activity (or GDP), which dampens business investment via accelerator effects. GDP in the euro area shows a similar pattern as business investment (Figure 3). While GDP has shown some signs of recovery since 2013, it is still far below its pre-crisis trend, as estimated on the basis of a five-year and ten-year period before the Global Financial Crisis, respectively.

All in all, the comparison of different key drivers of business investment suggests that low economic activity still constitutes the most important drag on business investment in the euro area at the current juncture.

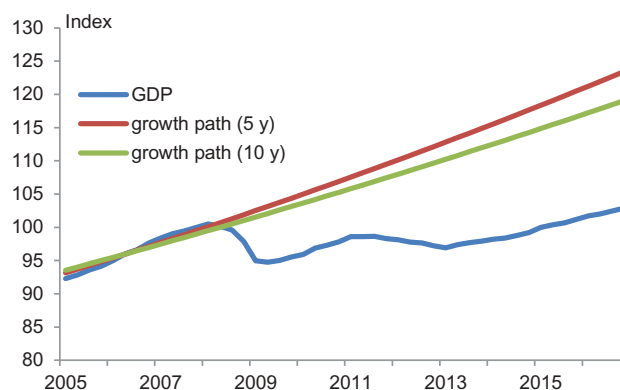


Figure 3. GDP and pre-crisis growth paths in the euro area (2005–2016).

Quarterly data, constant prices, seasonally adjusted. GDP: 2007Q4 = 100. Growth paths: log-linear trend based on a five-year or ten-year period before the crisis.

IV. Typical patterns of economic activity and business investment during financial crises

We exploit historical experiences with recessions and financial crises to determine how business investment in the euro area has developed in past years, relative to typical patterns. In doing so, we address the question of whether business investment is unusually low in the euro area at the moment (i.e. whether there is an ‘investment gap’). This is an important issue when thinking about adequate policy responses. If business investment is unusually low, policy measures that provide temporary stimuli (such as monetary policy measures) may be appropriate to encourage business investment and overall economic activity (Lewis et al. 2014). In contrast, if business investment is not unusually low compared to typical patterns or compared to the current level of GDP, such policies may not be successful in causing a sustainable acceleration in business investment. In fact, in this case structural policies that strengthen potential growth might be more appropriate (ECB 2016b).

We analyse and compare the typical patterns as follows. First, we review the literature on the impact of financial crises on GDP and describe what these results may imply for the impact of such crises on business investment. Since this literature does not explicitly deal with business investment, we then estimate the typical impact of financial crises on business investment based on a panel of advanced economies and compare our results with the actual path of business investment in the euro area since the Global Financial Crisis. Moreover, we investigate how the ratio of business investment to GDP typically develops during financial crises and how this ratio has developed in the euro area over the past years. This allows us to assess how business investment has developed given the path of GDP.

IV.a Typical patterns of economic activity during financial crises

There is a large empirical literature on the impact of financial crises on GDP. This literature generally finds that financial crises come along with recessions that are

deeper and longer than normal recessions, which are not associated with financial crises (Claessens, Kose, and Terrones 2009). Moreover, recoveries following financial crises are usually much weaker and show no signs of a rebound in the level of GDP, while recoveries following normal recessions are much stronger and show signs of a rebound in the level of GDP (Boysen-Hogrefe, Jannsen, and Meier 2016). Overall, there is a broad consensus that financial crises are associated with a significant and persistent decline in the level of GDP compared to the pre-crisis trend (IMF 2009; Reinhart and Rogoff 2009).³ Factors behind the persistent decline in GDP following financial crises include the large build-up of private or public debt or boom-and-bust phases in investment (see, e.g. Jorda, Schularick, and Taylor 2015; Jorda, Schularick, and Taylor 2016) that are associated with long-lasting adjustment processes like balance-sheet adjustments of private households, firms, and financial institutions. These factors are usually also associated with an unsustainable boom period featuring high growth rates in GDP and business investment. This suggests that pre-crisis trends might not measure the sustainable path of GDP and that a persistent decline of GDP below these trends is a normal consequence of a financial crisis. Furceri and Mourougane (2012), who find (in line with the results described above) that financial crises come along with a permanent decline in potential output, additionally offer a decomposition of this decline into changes in potential employment, the capital stock, and Total Factor Productivity (TFP). They show that a financial crisis leads to a permanent decline in the capital stock of about 3 per cent on average, while potential employment only declines by about 1 per cent and TFP remains basically unchanged. Their results, thus, suggest that financial crises require long-lasting adjustment processes in the capital stock that weigh on investment for several years.

IV.b Typical patterns of business investment during financial crises

So far there is only very rare direct evidence on the typical pattern of business investment during and after financial crises. We therefore explore this issue in more detail using a panel of 22 advanced

³While these studies do not focus on business investment, some of them also investigate the impact of crises on GFCF (Claessens, Kose, and Terrones 2009; Claessen et al. 2011; Jorda, Schularick, and Taylor 2013). Results for GFCF, which includes public investment and private residential investment, are similar to the results for GDP, even though the effects on GFCF are usually more pronounced.

economies over the period from 1970 to 2015. We consider a set of advanced economies and not euro area economies only for our empirical analysis because financial crises are relatively rare events. We use annual data because we are interested in long-run trends in business investment rather than short-run fluctuations.

Our empirical analysis is based on the local projections method proposed by Jorda (2005). This method is also commonly employed in the related literature (e.g. Jorda, Schularick, and Taylor 2013). In particular, we estimate the typical path of business investment y_{it} following the beginning of a crisis C_{it} in a panel framework including $i = 1, \dots, N$ countries:

$$\Delta_h y_{it+h} = \alpha_i + \beta_h C_{it} + \sum_{j=0}^p \Gamma_{jh} x_{it-j} + u_{it}, \quad (1)$$

where y_{it} denotes the logarithm of the level of business investment, so that the left-hand side variable $\Delta_h y_{it+h}$ measures the percentage change in business investment between time t and $t + h$ and β_h measures the impact of the beginning of a crisis C_{it} in period t on business investment in period $t + h$. We include a set of control variables x_{it} in equation (1) to control for the general macroeconomic environment, which may have a systematic impact on the path of business investment. The set of control variables includes GDP, consumer prices, and the effective exchange rate (all in growth rates) as well as the unemployment rate and long-term interest rates (both in levels). We follow Jorda, Schularick, and Taylor (2013) and include two lags of the control variables. Country fixed-effects are denoted by α_i . The local projections method involves an estimation of (1) for each period $h = 1, \dots, H$. We set the maximum horizon $H = 7$ because many crises in our sample start in 2008 and 2009 and we want our estimate of the reaction of business investment for each period to be based on the same number of crises.

Data for business investment is directly available for 15 advanced economies (Australia, Belgium, Canada, Denmark, Finland, France, Germany, the United Kingdom, Japan, the Netherlands, New Zealand, Norway, South Korea, Sweden, and the United States). For the other advanced economies we use the closest corresponding available data in the OECD Economic Outlook, namely GFCF

excluding private residential investment (Austria, Italy, Ireland, Portugal, Spain, and Switzerland) or total GFCF (Greece). Our indicators for crises are taken from the database of Laeven and Valencia (2013). In particular, we resort to their dummy variables for banking crises as banking crises typically have the largest effects on economic activity compared to other financial crises. Moreover, sovereign debt crises in our sample only took place in euro area countries after the Global Financial Crisis. We also exclude banking crises in euro area countries from our sample that are associated with the Global Financial Crisis. This allows us to compare the estimated typical pattern of business investment following crises with the currently observable path of business investment in the euro area.

Our results show that business investment declines sharply for 2 years after the beginning of a banking crisis (Figure 4). Thereafter, business investment starts to increase again. However, it does not increase faster compared to the path of business investment in the absence of a crisis (baseline). Hence, following a crisis, business investment shows no sign of a rebound and is permanently dampened. This finding is in line with Janssen (2015), who shows that recoveries following banking crises are usually weak and that the level of business investment exhibits a persistent decline. Following normal recessions, however, recoveries in business investment are stronger (the deeper the preceding recession, the stronger the subsequent recovery) and business investment is not permanently dampened.

To address the question of whether business investment in the euro area since 2008 has developed in line with historical experiences we have to define a relevant baseline for the euro area, i.e. to answer the question of how business investment would have evolved in the absence of the Global Financial Crisis and the Sovereign Debt Crisis. Obviously, this question cannot be answered exactly. Based on historical evidence business investment is likely to grow broadly in line with potential output or even slightly faster. Given that potential output in the euro area has grown by about 2 per cent on average during the last 20 years, we assume as a baseline that business investment would have grown by 2.5 per cent per year. This growth rate is also in line with the average growth of business investment between the beginning of the euro area and the year 2008.

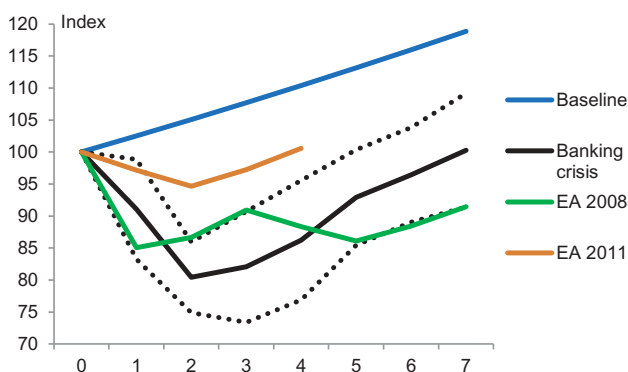


Figure 4. Business investment during banking crises and in the euro area.

Annual data. Index = 100 in the year before a crisis starts. Baseline: Path of business investment without a crisis, assuming a constant growth rate of business investment of 2.5 per cent per year. EA 2008: Path of business investment since 2008 (Global Financial Crisis). EA2011: Path of business investment since 2011 (Sovereign Debt Crisis). Banking crisis: Estimates based on a panel of 22 advanced economies using local projections; banking crises in the euro area since 2008 are excluded from the estimation. Dotted lines indicate two-standard error bands. Year 0 denotes the year before the beginning of a banking crises or the year 2008 or 2011 for the euro area variables.

It turns out that business investment in the euro area is somewhat below the typical path of business investment after banking crises. However, taking into account the uncertainty surrounding such estimates, business investment has by and large developed in line with what could have been expected based on historical evidence. Moreover, it is important to take into consideration that the euro area was not only hit by the Global Financial Crisis but also by the Sovereign Debt Crisis. In fact, the occurrence of the second crisis might largely explain why business investment is somewhat below the typical path. Interestingly, if we separately consider the development after each crisis, it turns out that in each case business investment in the euro area has performed relatively well compared to typical historical patterns.

IV.c Typical patterns of the business investment-GDP ratio during financial crises

In a next step, we perform a similar empirical exercise – using the same data set and the same empirical method – but look at how the business investment-GDP ratio typically evolved during banking crises in the past.⁴ If this ratio declines, business investment grows slower

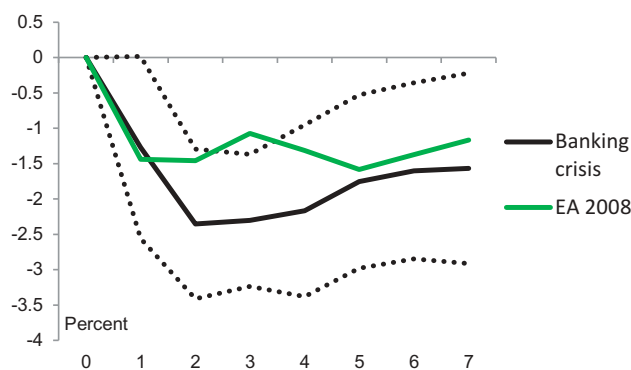


Figure 5. Business investment relative to GDP during banking crises and in the euro area.

Annual data. EA 2008: Change in business investment relative to GDP since 2008 (Global Financial Crisis). Banking crisis: Estimates based on a panel of 22 advanced economies using local projections; banking crises in the euro area since 2008 are excluded from the estimation. Dotted lines indicate two-standard error bands. Year 0 denotes the year before the beginning of a banking crises or the year 2008 for the euro area variable.

(or declines faster) than GDP. We find that this ratio declines sharply in the first 2 years after a banking crisis and moderately recovers thereafter (Figure 5). Comparing this typical path with the actual ratio of business investment to GDP in the euro area since 2008 reveals, first, that this ratio declined by far less during the Global Financial Crisis than it typically did during other banking crises and, second, that it moderately recovered in 2014 and 2015. These results suggest that business investment has developed relatively well compared to overall economic activity. These results therefore strengthen the evidence that it is mainly weak overall economic activity that represents the crucial factor behind the weakness in business investment in the euro area and not the other way around.

V The role of monetary policy

One reason why the accommodative monetary policy of the ECB may not have triggered a rebound in business investment could be that monetary policy is generally less effective in stimulating economic activity or business investment during or in the aftermath of financial crises. The question of whether the effectiveness of monetary policy depends on the state of the economy has frequently been investigated in the literature. Studies that compare the effectiveness of monetary policy in expansions and recessions come

⁴We calculate the business investment-GDP ratio based on volume series that are price-adjusted using the same reference year.

to mixed results. While earlier studies found that monetary policy is more effective during recessions than during expansions (Weise 1999; Garcia and Schaller 2002; Peersman and Smets 2002; and Lo and Piger 2005), these results have been challenged by more recent studies that found that monetary policy is less effective during recessions (Tenreyro and Thwaites 2016). After the onset of the Global Financial Crisis in 2007, some studies more specifically addressed the question of whether the effectiveness of monetary policy is different during financial crises and in their aftermath.

From a theoretical perspective, the effectiveness of monetary policy in the aftermath of a financial crisis is ambiguous. It could be less effective because financial crises (specifically banking crises) are usually associated with several characteristics that may harm some of the transmission channels through which monetary policy stimulates economic activity and business investment. Banking crises are usually preceded by periods of a large build-up of private debt and associated with boom-and-bust cycles in the housing market followed by a significant turmoil in the financial sector. As a consequence, important transmission channels of monetary policy, such as the credit and the interest rate channel, could be impaired during and in the aftermath of banking crises. Credit demand may react less to changes in monetary policy because private households and firms seek to reduce their high debt levels and because they are less credit-worthy due to their high debt levels and the devaluation of collateral that they can offer. Credit supply may react less to changes in monetary policy because financial institutions face high credit default risks, seek to repair their balance sheets, and may face financial constraints. Moreover, even in the absence of credit constraints residential investment, which is a particularly interest rate-sensitive component of GDP, could react less to impulses from monetary policy due to the oversupply of housing that has been created during a preceding boom in the housing market. However, there are also theoretical arguments why monetary policy could be more effective during financial crises than during normal times. While financial constraints on financial institutions, low confidence and high uncertainty may weigh on the effectiveness of monetary policy, they also directly have an adverse impact on economic

activity. To the extent that monetary policy is able to reduce financial constraints and uncertainty and to lift confidence, it could be more effective than in normal times.

Given the mixed theoretical predictions, the question of how effective monetary policy is during as well as in the aftermath of financial crises remains largely an empirical one. While this question has not been finally answered yet, empirical studies so far have suggested that monetary policy is more effective at the beginning (or at the acute phase) of a crisis, in which uncertainty is high, confidence is low and the economy is in deep recession. However, monetary policy seems less effective, or even not effective at all, in stimulating economic activity in the aftermath of financial crises. Ciccarelli, Maddaloni, and Peydro (2013) analyse the effectiveness of monetary policy in the euro area between 2007 and 2011 and find that monetary policy was more effective in the first years of the Global Financial Crisis. Dahlhaus (2017) provides evidence that, in the United States, monetary policy is more effective in periods of high financial stress. Usually, periods of high financial stress are observed at the beginning of financial crises. However, Bech, Gambacorta, and Kharroubi (2014) show that monetary policy has no significant effect on the strength of the recovery following financial crises; by contrast, it has significant effects on the strength of recoveries following normal recessions that are not associated with financial crises. Janssen, Potjagailo, and Wolters (2015) reconcile these results using a panel of 20 advanced economies. They also find no evidence that monetary policy can significantly stimulate economic activity in the aftermath of financial crises. During the acute phase of a crisis, however, monetary policy may have strong effects on real GDP by reducing financial constraints as well as uncertainty and by restoring confidence.

Overall, the empirical evidence suggests that monetary policy in the euro area has significantly contributed to stabilize economic activity and business investment during the acute phase of the Global Financial Crisis and the Sovereign Debt Crisis. However, the results also suggest that it has been largely ineffective in further stimulating economic activity and business investment in the aftermath of these crises. Given the strong nexus between economic activity and business investment and given

the finding in the literature that weak economic activity is the main impediment of business investment at the current juncture, these results indicate that there is little scope for monetary policy to further stimulate business investment.

VI. Summary and conclusions

Business investment in the euro area has still not reached the level of the year 2008 and is far below its pre-crisis trend. While recovering from the Global Financial Crisis, the euro area economy was hit by a second crisis, the Sovereign Debt Crisis. Until the beginning of the second crisis, the recovery in business investment was in line with typical recovery paths of other advanced economies, such as the United States. Even though business investment in the euro area has recently grown again at solid rates, overall the recovery is widely perceived to be disappointingly weak. In this article, we have analysed the reasons for the sluggish recovery in business investment in the euro area and the role of monetary policy in this regard.

We conclude that low economic activity constitutes the most important explanatory factor whereas uncertainty has alleviated and financial constraints seem not to be a major impediment of business investment at the aggregate level. Based on historical evidence from other crises in advanced economies, we show that a persistent decline of economic activity and business investment below pre-crisis trends is a typical pattern. If economic policies, such as monetary policy, were not systematically wrong during past crises, these findings suggest that currently monetary policy can do little to further stimulate economic activity and investment. We also show that business investment in the euro area has developed broadly in line with typical historical patterns. This indicates that business investment is rather at a normal level and there is no significant ‘investment gap’ at the current juncture, which could be closed by economic policy measures that only bring about temporary stimulus. Given the low level of economic activity, business investment has actually been relatively robust compared to other financial crises. Monetary policy has contributed to reduce uncertainty and financial constraints and thereby stabilized business investment in the euro area particularly at the height of the financial crises.

However, given that uncertainty and financial constraints do not significantly impede business investment anymore, any further reduction of uncertainty or further improvements of financial conditions will hardly provide noticeable additional stimuli to business investment. This argumentation is in line with several empirical studies providing evidence that monetary policy is by and large ineffective in the aftermath of crises since these are usually associated with several characteristics that hamper important transmission channels, such as private indebtedness and long-lasting balance-sheet adjustments.

Altogether, our analysis suggests that business investment will likely remain weak for some time to come and stay below its pre-crisis trend. This seems to be a typical consequence of a financial crisis. Monetary policy may have significantly contributed to stabilize business investment at the beginning of the Global Financial Crisis and the Sovereign Debt Crisis in the euro area. At present, however, there appears to be little scope for the ECB to further stimulate investment. Consequently, structural policies that aim at improving potential output seem a more promising way in order to achieve a sustainable acceleration in investment activity in the future.

Disclosure statement

No potential conflict of interest was reported by the authors.

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