NEW APPROACHES TO ECONOMIC CHALLENGES

ORIGINS OF THE CRISIS: Drawing the big picture

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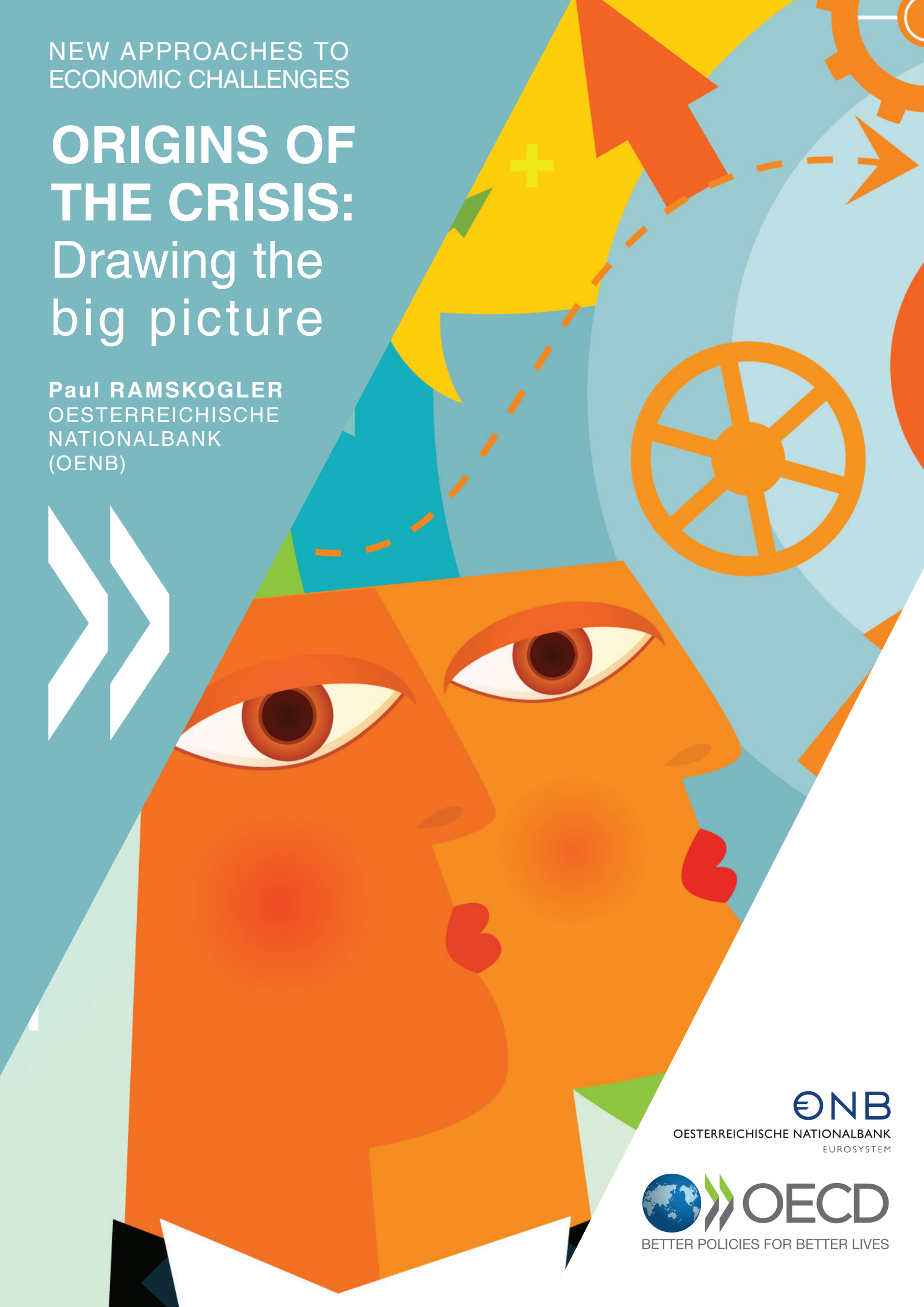

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MAIN FINDINGS

- The secular decline of inflation in the 90's triggered the structural reduction of **policy and short term interest rates** in major industrialised countries. This made debt cheap and thus **contributed** to **excessive leverage ratios** and **a** high dependence of many investors on wholesale markets**.** Risks on the liability side of investor's balance sheets increased.

- The massive **inflow of capital** from emerging Asia to the US pushed **long term interest** rates **down**. European and US investors were crowded out and increasingly invested into securitised bonds. This development **amplified risks on the asset side** of the balance sheet of many financial institutions.

- The willingness of intermediaries to accept higher risks intertwined with the desire of many households to increase their leverage. **Cheap and easy credit became a substitute for rising incomes** as relative income levels plummeted and real income growth was subdued.

- At the same time, there was an increased shift towards capital based pension systems. Also the concentration of wealth rose. Both developments increased the funds of **institutional investors** particularly in the US and Europe and fundamentally **changed the structure of demand** on capital markets. The demand for safe assets increased while at the same time the search for yield intensified.

- Securitised bonds and the rise of the **shadow banking** industry fuelled the production of seemingly safe yet profitable investment opportunities that were attractive for institutional investors. This **was the main avenue through which institutional funds were channelled into the US mortgage market**.

- Safe ratings for securitised bonds however were due to **fundamental flaws in** the **underlying rating models**. At the same time high ratings were partly achieved by unloading some of the risks on banks' balance sheets. This was facilitated by **insufficient risk management and flawed incentives of the top executives.**

- Finally, the **regulatory environment** failed to address the challenges that were building up on financial markets. Many shadow banking instruments circumvented regulatory requirements and associated risks were not sufficiently acknowledged by regulators. In particular, **regulatory capture and** the **lack of coordination** across jurisdictions led to a light touch in regulation. This was aggravated by structural tax biases.

1. INTRODUCTION[12]

1. The global financial crisis and the ensuing Great Recession served as a key motivation for the OECD Initiative on *New Approaches to Economic Challenges* (NAEC). The severity of the crisis and the challenges that arose in its wake signalled that existing arrangements for economic stability and the attainment of other economic and social policy objectives were no longer adequate. The crisis erupted against the backdrop of a range of internal and external macroeconomic weaknesses. Entering the sixth year of the crisis, many OECD economies have not recovered to pre-crisis GDP levels yet. Potential output might have experienced a permanent dent (OECD 2014a). Despite a lot of progress already achieved, major challenges lie ahead and governments still need to deal with many looming remnants from the crisis. Unemployment rates are high, especially amongst the young and access to credit is constrained in many countries. Private and public debt levels are elevated and deleveraging needs as well as concomitant fears of deflation still threaten to shatter the recovery. Finally, waves of unconventional monetary interventions have been necessary to backstop the crisis. The unwinding effects of these measures on internal and external stability though are essentially unknown.

2. Yet, OECD economies are slowly exiting the crisis and policy makers are gradually leaving the emergency mode. This makes it even more important to maintain momentum for reform and to concentrate on carefully designing the post-crisis economic architecture. Understanding the driving forces that lead to the build-up of the crisis will be essential in order to avoid making the same mistakes again. This insight motivated the NAEC group to investigate "The crisis: Drawing lessons from history and past experience" (Project A1). This paper presents a first outcome of this project. It is an investigation of the roots of the *current* crisis. In particular it aims at investigating the developments until the first problems materialised between 2007 and 2008.It aims at summarizing the major insights gained in this literature thus far. The main focus, hereby, lies on empirical findings while the relative arguments are tethered to historical developments and arguments of the political economy. There is a vast set of analyses and hypothesis concerned with one or the other detail of the build-up of the crisis. The value added of this paper is to assemble the different building blocks to one big mosaic and to derive a consistent meta-narrative of the crisis.

3. A useful analogy in describing the build-up of the global crisis is that of a huge dam that protects an inhabited valley. For a long time the dam released a steady stream of water in the process of energy production that fuelled a river flowing through the valley. However, the water influx to the dam started to rise, steadily so, but at an ever increasing pace. At some point the water influx was over and above what could be safely released without endangering the inhabitants of the valley. With the water line rising constantly, eventually the dam's locks burst open one after the other. Energy production broke down and the local river flooded nearby villages. What once had been indispensable for the life of the valley's inhabitants now had become a deadly force.

4. Similarly, before the crisis the financial industry for a long time was operating like a dam producing growth while preventing excessive debt ratios. However, major internal and external **macroeconomic imbalances increased the influx of water** and thus raised the water line behind the dam.

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[1] The views expressed in this paper are those of the author and do not necessarily reflect the views of the OeNB or the OECD.

[2] This paper has benefited greatly from the comments of David Bradbury, Dominik Bernhofer, Boris Cournède, Oliver Denk, Martin Gächter, Stephanie Guichard, Mathilde Mesnard, Elena Miteva, Celine Kauffmann, Mark Pearson, Lukas Reiss, Alexandra Riedl, Doris Ritzberger-Grünwald, Karin Rysavy, Helene Schuberth, Edith Waltner Beat Weber and Birgit Wilder. All remaining errors are mine.

On the one side, the low interest rate environment formed a supply stream that increased the willingness of the financial system to accept leverage and to create credit. At the same time the search for investment opportunities by institutional investors and rising willingness of households to move into leverage triggered by increasing inequality formed a demand dam that increased the demand for credits and for credit based products at the same time. . This structural increase in desired credit creation was held back by **regulatory requirements and investment frameworks** of institutional investors. These **formed a dam** between desired mortgage creation and institutional investors' capital that prevented credit and leverage ratios from rising instantaneously to unhealthy levels. Though, the rise of **shadow banking instruments burst one lock after the other open**. On top of the deregulatory advances since the 80ies remaining regulatory requirements and investment provisions were bypassed. Mortgages soared, were securitised and (directly or indirectly) sold to institutional investors. As a consequence, the steady flow of credit – as indispensable for the functioning of a market economy as energy production for a modern society – led to a stock that once having surpassed a critical level turned into a flood that endangered the orderly functioning of the involved economies. This has left us with a legacy of high debt, both public and private.

5. Along these lines, the discussion in **the first part of the paper** will start with the major **macroeconomic** developments and the reasons for soaring leverage ratios before the crisis. On the supply side, two crucial developments occurred in the run-up to the crisis. Against the backdrop of a secular decline in inflation rates, central banks were able to set very **low policy rates** for extended periods of time. At the same time, **capital** was **flowing into the US**. Both developments depressed interest rates – short and long term – triggering a search for yield while making leverage cheap. On the demand side, **credit** was used **as a substitute for incomes** as rising inequality had led to losses in relative incomes for large parts of the population. These segments of the population were able to uphold consumption levels –in particular housing demand – beyond sustainable levels by increasingly moving into leverage.

6. The **second part of the paper** is focused on the analysis of the structural rise of pressures related to investors. Ageing, the concentration of wealth and privatization of associated risks contributed to the growth of **institutional investors** whose demand profile is skewed towards 'safe' assets. This gave **rise to the shadow banking industry** that succeeded in producing assets with relatively high yields while at the same time benefitting from investment grade ratings. It was the moment of glory of the market for securitised bonds (SBs)[3] that ultimately channelled the funds of institutional investors into the mortgage markets. However, the perceived safeness was deceptive due to structural failures in rating methods. Also perceived safeness was increased by shifting substantial proportions of tail risks to the balance sheets of the financial institutions that acted as originators. This was enabled by **lacking governance structures as well as by a systemic failure of the regulatory regime**. Even worse, through distortionary taxes governments even reinforced the flawed incentive structure in the run-up to the crisis.

[3] Following Manconi et al. (2012) the term securitised bonds (SB) is used as umbrella term asset-backed securities (ABS) mortgage backed securities (MBS) that are bonds issued by special purpose vehicles based on pooled assets and collateralised debt obligations (CDO) that also include a hierarchical ordering of the payouts. Thus, the umbrella term it is also intended to include the notorious subcategory of residential mortgage backed securities (RMBS) as well as the more specific asset-backed commercial paper (ABCP). While – in principle – this can include assets other than commercial or residential mortgages, the vast majority of the associated securities were based on such assets before the crisis and we will thus exclusively focus on this aspect of that market.

2. THE GLOBAL FINANCIAL CRISIS: KEY CHARACTERISTICS

7. **A number of key developments are characteristic for the current crisis**. Economies with high rates of credit growth before the crisis experienced the most adverse effects (Lane and Milesi-Ferretti 2010). This was particularly the case when credit growth, strong growth in real GDP and a high exposure to external funding from advanced economies had coincided before the crisis (Feldkircher 2014). While this seems to be an aspect common to other crisis episodes, it is rather unusual that the current crisis has hit countries with high levels of GDP per capita hardest (Lane and Milesi-Ferretti 2010). Other specific features of this crisis were the widespread use of opaque and complex financial instruments, and the interconnectedness and high leverage of financial institutions (Claessens et al. 2010). The fact that bank-funded off-balance sheet vehicles engaged in term-transformation – financing a large amount of long-term assets with short-term liabilities – was also specific to this crisis (Kalemli-Özcan et al. 2011). This explains why primarily countries with a highly developed financial system were affected and why liquidity shortages were more severe and triggered the necessity for longer liquidity assistance than it has typically been the case during earlier financial crises (Laeven and Valencia 2010).

8. **High credit growth and excessive leverage ratios were decisive** for the build-up of the current crisis. As in past crises episodes, financial liberalisation followed by a banking boom stood at the beginning of the current turmoil (Reinhart and Rogoff 2009). Though, high public debt levels have been found to aggravate recessions following the burst of a credit-boom (Jordá et al. 2014a and 2014b) and they have certainly done so during the current crisis. Further – in particular in the euro area – there was a mutually reinforcing process of deteriorating risk perceptions about bank and sovereign debt present in many jurisdictions at the height of the crisis (see Box 1). Nonetheless, even in this case, it was essentially a financial crisis that transformed into a sovereign debt crisis and not the reverse (Reinhart and Rogoff 2013). Consequently, the primary focus of the literature – and thus of this paper – is on the determinants of excessive private sector leverage and its relation to financial distress.

9. The next chapters will look into **the macroeconomic and institutional reasons for the build-up of excessive leverage,** somewhat simplifying the complexities and interdependencies. In detail, these two chapters will focus on:

> i) **Factors driving supply and demand for credit**. On the supply side, these are low policy rates and international capital flows, on the demand side, growing inequality and the concomitant increase in the desire for credit-financed consumption.
>
> ii) **Factors framing the growth of credit.** Ageing-related policies and the concentration of wealth fuelled the rise of institutional investors and fundamentally altered the demand for assets. At the same time, insufficient risk management and flawed incentives of CEOs induced banks to accept excessive tail risks. This increased the issuance of SBs pushing down boundaries between institutional investors and the mortgage market. Finally, the regulatory framework failed to prevent the build-up of excessive credit levels (Brunnermeier 2009).

3. THE PERILOUS INTERACTION OF CREDIT SUPPLY AND DEMAND

10. The **price** (i.e. interest rate) **determination on credit markets is somewhat peculiar**. First of all, credit rates might be, to some extent, directly affected by policy rates set by central banks. Further, credit rates crucially depend on the risk assessment by banks (see section 3.2.2.). Situations of excess demand might arise (e.g. Mankiw 1986), but at the same time, a systematic under-pricing of risks might lead to the excessive creation of credit. These idiosyncrasies rendered a prominent role to interest rates in explaining the crisis.

11. **The adequacy of** the level of the **market rate is often evaluated against the concept of the natural interest rates** originally introduced by the Swedish economist Knut Wicksell (1851-1926) (Borio and Disyatat 2011). The distinction is based on the assumption that a 'natural' rate of interest exists (usually defined as the expected return on newly produced capital goods) at which the price level is constant (Screpanti and Zamagni 2004). If the market rate is lower than the natural rate the price level rises and vice versa (Leijonhufvud 1997). Explanations of the crisis focusing on the interest rate implicitly (and sometimes explicitly) assume that the market rate was below the natural rate thereby triggering the housing bubble. Two developments are outstanding with regard to low interest rates. On the one hand, there is the secular decline in inflation and thus policy rates. On the other hand, there are international capital flows that interacted with the low policy environment and the long-run interest rate. These will be discussed in the following sections in turn.

3. 1. Policy rates and cheap leverage

12. *In short,* explanations that focus on policy rates are based on the following reasoning. The two decades before the crisis saw unprecedentedly low inflation. This allowed central banks to extensively use the policy rate to fight recessions and unemployment. However, after the latest recession – triggered by the burst of the dot.com bubble – policy rates, especially in the US, were left at low levels for too long. As a consequence, credit was too cheap adding to the asset price bubble.

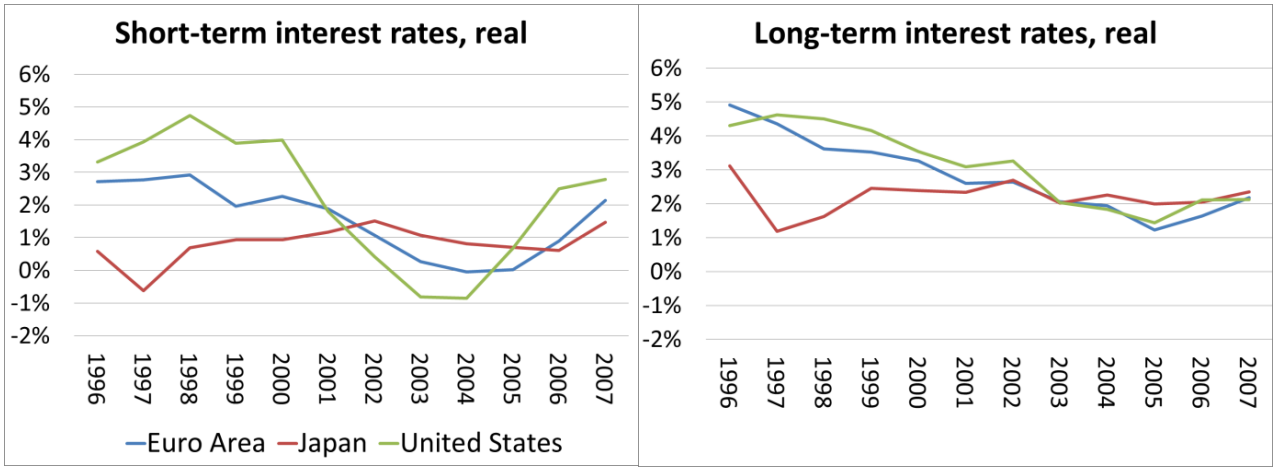
13. S**ince the beginning of the 90's** most central banks were following **some form of inflation targeting strategy. The ex-post behaviour of central banks may well resemble a Taylor rule**. A central bank following a Taylor rule aims at setting the interest rate at the level of the (hypothesised) natural rate. If inflation is below (above) the targeted level and if output is below (above) potential output, the central bank reduces (raises) the interest rate below (above) the level of the natural interest rate (Woodford 2001). Whether the behaviour is dominated rather by concerns about inflation or by concerns about output depends on the loss function given by the central banks' mandate. Taylor rules were usually not adopted explicitly. Yet many moved to policies focusing on price stability throughout the 1980's and early 1990's and Taylor rules turned out to be useful in describing central bank behaviour empirically for a long time (Taylor 2010).

14. Indeed, **inflation rates and expectations were anchored at low levels** (Ahrend et al. 2008). Of course, the reduction of inflation was also linked to globalisation (White 2013). Former centrally planned economies and China engaged in reforms opening their economies to the world market. These developments had the effect of a positive labour supply shock for the world economy (Jagannathan et al. 2013) that in some countries was accompanied by a secular decline in the bargaining power of trade unions. As a result, cheap imports and the threat of offshoring contained price growth and exerted downward pressures on wages in advanced economies. At the same time, fundamental innovations in the IT-industry boosted productivity in many sectors (Bergeaud et al. 2014), which further contained overall price growth.

15. **After the burst of the dot.com bubble, the stability of inflationary expectations allowed central banks to leave policy rates at low levels for an unusually long time**. Exaggerated expectations about the impact of the IT industry on productivity had led to excessive hikes in the prices of the stocks of the 'New Economy'. A particular problem was the disregard of financial developments which had led to the systematic overestimation of potential output before the crisis (Borio et al. 2013, Bernhofer et al. 2014). As a result central banks – by design – did not react to overheating in the financial sector. Further, growth during the initial stages of the recovery after the burst of the dot.com bubble had been 'jobless' as unemployment remained high. With inflation being low, central banks felt free to fight against elevated levels of unemployment (Rajan 2010). It has also been argued that monetary policy had to remain expansionary for a long time in order to counter the slack in private demand growth resulting from rising inequality and subdued wage growth (Fitoussi and Saraceno 2010).

16. **While being successful in fighting unemployment, the monetary policy reaction function of the Federal Reserve System (the Fed) after the crisis may not be well described by a Taylor rule any longer. In fact it appears as if** expansionary monetary policy was pursued way into the recovery (Taylor 2010, Borio and Disyatat 2011). During the same period, incomplete business cycle convergence within the Euro area resulted in a situation in which, for some of its member countries, monetary policy rates (that were focusing on conditions in the euro area as a whole) were persistently below what a "country-focused" Taylor rule would have suggested (Ahrend et al. 2008, Lumpkin 2014). While this is almost by definition the case for a monetary union that is exposed to asymmetric shocks, the macro-prudential framework proved insufficient to tackle all problems that were arising out of this situation.

Figure 1: Short-term and long-term interest rates



Note: Real interest rates are calculated as the nominal interest rate less the annual headline inflation rates (PCE deflator for the United States and Japan; and HICP for the euro area).

Source: OECD Economic Outlook database,

17. **The problem with this is that too low policy rates often have been associated with asset and house price bubbles**. Policy rates below those implied by the Taylor-rule have been correlated with asset price increases in many economies before the crisis (Ahrend et al. 2008). For a more extended period – ranging from 1920 to 2011 – expansionary monetary policy in advanced economies in general has been found to have contributed to asset price booms (Bordo and Landon-Lane 2013). There is also some evidence that low policy rates have added to the surge in US housing demand in the period preceding the current crisis (Jarocinski and Smets 2008). Consequently, low policy rates might have increased the

demand for mortgages (Obstfeld and Rogoff 2009) and therefore loose monetary policy has been identified as an important driver of the US mortgage bubble (Taylor 2010).

18. Indeed, **credit creation in advanced economies has been insufficiently constrained,** thus exacerbating the effect of low policy rates. In particular there has been 'excess elasticity' in financial systems that accommodated the build-up of financial imbalances and enabled an overshooting of credit supply (Borio and Disyatat 2011, Shin 2011). Banks hereby circumvented and minimised reserve requirements via a variety of instruments (Cabral 2013). In the end, structurally mislead risk assessments in combination with the rise of shadow banking (see section 4.3.) induced banks to excessively increase leverage ratios.

19. **Cheap wholesale funding has been identified as an important channel triggering excess credit supply** (Borio and Zhu 2008, Altunbas et al. 2010). Though, since central banks mainly affect short term interest rates the factors determining long term rates have figured even more prominently in the discussion. Indeed, long term rates that generally influence investment decisions are determined on capital markets and driven by the yield on government bonds (see section 3.2.). Consequently, low policy rates have stimulated risk taking by intermediaries, mainly by making funding cheaper. This led intermediaries to accept more risks on the liability side of their balance sheets by inducing them to increase the ratio of wholesale funding (such as e.g. interbank-loans) to demand deposits which, indirectly, fuelled credit growth. Since the wholesale market is professionally managed, this way of financing is significantly more sensitive to new information about arising risks. As alienated lenders might refrain from rolling-over the debt intermediaries thus became especially vulnerable in times of distress. Further wholesale funding is strongly depends on the value and especially the average haircut on the underlying collateral which fuels procyclical behaviour in this regard (see sections 4.2., 4.3. and Geanakopolos 2009).

20. However, it should be noted that **there has also been some evidence questioning the impact of policy rates on leverage**. In particular, analysis has been presented that found no or only a modest relation between short term interest rates and financial leverage (Merrouche and Nier 2010, Dokko et al. 2011). This counters the above findings and highlights the need for further research on the link between monetary policy and risk taking.[4]

21. **In any case, there was a substantial growth of wholesale funding amongst institutions that invested in the build-up of the US housing bubble** (Shin 2012, Carmassi et al. 2009). Mainly European banks that invested in asset-backed securities raised a great part of their funding on wholesale markets (Shin 2012, Bernanke et al. 2011) but also US investment banks tapped these markets for up to a quarter of their funding (Carmassi et al. 2009). It has also been demonstrated that lending standards in the euro area and the US were affected rather by short term policy rates than long term rates (Maddaloni and Peydró 2011). Further central bank policies might influence long term interest rates indirectly by affecting expectations of capital market participants. It has been argued this is exactly what happened when the Fed's Governor, Alan Greenspan, reiterated his view that it is not the job of monetary policy to address bubbles before they burst, but it is its job to "mitigate the fallout when it occurs" (Greenspan 2004). This approach came to be known as the 'Greenspan put' (Rajan 2010).

22. Summing up the argument, inflation was successfully contained and growth sustained. Still against the backdrop of loose regulatory grasp on financial institutions expansive monetary policy

[4] Further, it should be stressed that the counterfactual – i.e. what might have happened had the FED increased interest rates – earlier is unknown. In particular, given the fact that also the institutional environment was relevant (see section 4), it is unclear whether an increase of policy rates sufficiently large to prevent the housing bubble might not have had deflationary consequences on to the consumer price index.

contributed to excessive risk taking. Arguably, this has particularly affected the liability side of banks' balance sheets. However, hadn't there been a number of concomitant global developments, imbalances would have never become sufficiently large to trigger a global crisis. This is especially the case of the large US current account deficit, which turned the country to a consumer of last resort to the world economy (Cate et al. 2010). Had this deficit not been accompanied by corresponding capital inflows, the US dollar would have experienced a steady and substantially stronger devaluation than it actually has. In this case, the effect of expansionary monetary policy might have been different, i.e. triggering inflation or investments into the export industry rather than a housing price bubble. This draws the attention to global capital flows which are discussed in the next section.

3. 2. Disentangled global capital flows

23. *In short* global capital flows contributed to the crisis in the following way: After experiencing major current account problems during the 90's, emerging – especially Asian – economies fostered net exports and constrained capital outflows in order to build-up international reserves as an insurance against future crises. This led to a massive accumulation of international reserves – pivotally invested in US Treasuries – that financed the US current account deficit and added to the reduction of long term interest rates. This resulted in the crowding out of institutional investors – primarily from Europe and the US – that were searching for high yields on safe assets. These investors started to substantially increase their exposure to SBs, thus eventually providing the capital that led to the build-up of the crisis.

24. **Key events determining the dynamics of international capital flows had taken place in the 90's**. The period witnessed a marked reduction of business cycle volatility in industrialised economies, often referred to as the 'great moderation' (Bernanke 2004), although, the period was not that moderate for emerging market economies. To the contrary, the 1990's witnessed a wave of successive crises. In 1994/95, Mexico – overburdened with international debt due to excessive public spending – was hit by the 'peso crisis' including a currency crash and major difficulties to settle dollar denominated public bonds. At the same time, economies in South East Asia were still benefitting from international capital inflows that fuelled investment and growth. However, capital was mainly granted on a short-term basis and soon after the first signs of tension started to crystalise in Thailand, the entire region was shattered by massive capital flight that sent most local economies into economic abyss (Diamond and Rajan 2009). Soon Russia, Brazil, Argentina and Turkey were to experience severe financial distress as well.

3. 2. 1. Net capital flows and the long-term rate

25. Importantly, **the South East Asian crisis triggered policies that fostered the accumulation of foreign reserves in the region**. Most of the emerging Asian economies required IMF assistance accompanied by macroeconomic adjustment programmes (Allen and Carletti 2010) that have been considered as being overly harsh by some commentators (Rajan 2010). In an effort to avoid comparable distress in the future, many economies of the region started to pursue policies aiming to build up pillars of international reserves (Obstfeld and Rogoff 2009). This is consistent with the finding that IMF programs had in general a significantly positive impact on the subsequent accumulation of reserves of the affected economies (Bird and Mandilaras 2011).

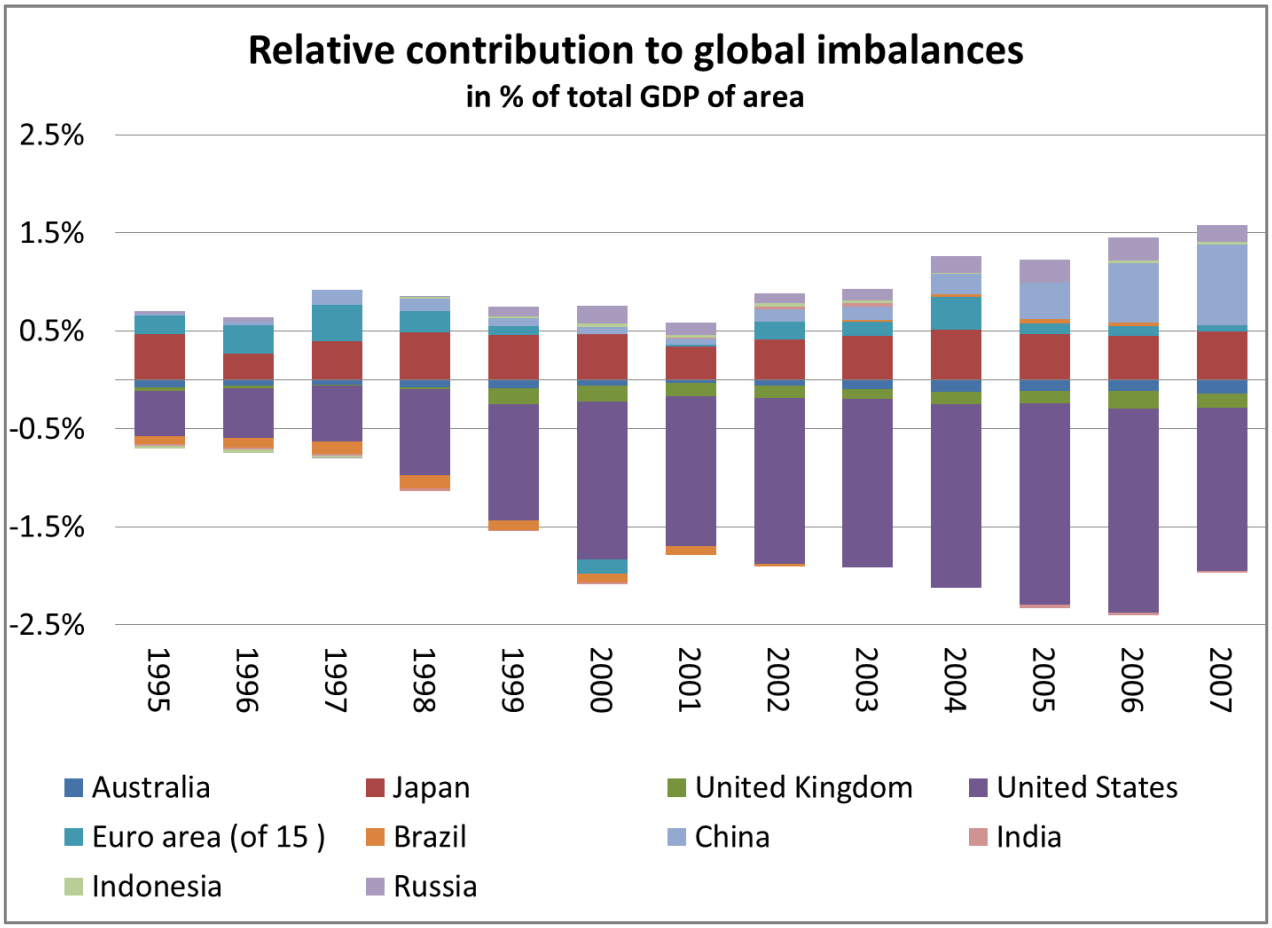
26. These policies seem to have been motivated by the fact that the relative amount of international reserves held by a country has been one of the very few robust predictors of crisis incidence and severity in the past. A higher level of international reserves regularly is found to reduce the propensity of being exposed to severe financial distress and reduces the adverse impact of distress once a country has been hit by a crisis (Frankel and Saravelos 2010). However, it is not yet clear whether a higher level of international reserves has really helped all countries during the current crisis (Blanchard et al. 2010, Rose and Spiegel 2011). Given the motivation of capital flows as an insurance against crises, this is somewhat surprising. At

least, exchange rates in countries that held higher levels of international reserves tended to appreciate during the initial stages of the crisis (Obstfeld et al. 2009). Further, international reserves have mitigated the effects of financial stress particularly when domestic funding via credit had been abundant before the crisis (Feldkircher 2014).

27. In any case, on the **flipside of the accumulation of international reserves by emerging economies since the end of the 1990's were capital inflows into countries** with highly developed and reliable financial systems, **most notably into the US** a development sometimes labelled as 'global saving glut' (Bernanke 2005). Part of the reason for this has been attributed to underdeveloped financial systems and undervalued exchange rates in emerging economies that constrained domestic credit growth and thus triggered capital exports (Blundell-Wignall 2013). In the US – and without implying causality in either direction – this development was reflected by rising current account deficits.

28. **Asian capital inflows into the US were predominantly invested in Treasuries; not in SBs** (Bernanke et al. 2011, Bertaut et al. 2012, Shin 2012). Since capital from the reserve accumulating emerging economies did not directly flow into SBs, the saving glut explanation of the crisis has been called into question questioned as a potential explanation of the roots of the crisis (Borio and Disyatat 2011).

Figure 2: Global imbalances



Source: OECD Economic Outlook, own calculations.

29. However, **the interest rate on Treasuries governs long term interest rates and thus influences the behaviour of investors**. This is the case as these assets function as secure fall-back option for investors (Ferguson 2008). The high demand for Treasuries thus apparently pushed down long term interest rates in the run-up to the crisis (Betraut et al. 2012). This again might have triggered crowding out effects leading to a 'search for yield' with investors switching to alternative markets (Gros 2009, Jaghannathan et al. 2013).

3. 2. 2. Gross capital flows and the demand for securitised bonds

30. At the same time **the euro area had a relatively balanced current account, though imbalances were building up within**. In fact, as imbalances were piling up between the US and emerging Asia, the developments in Europe, somewhat caricatured this development. Current accounts within Europe widened in the decade preceding the crisis, particularly strongly so in the euro area between 2003 and 2007 (Lane 2012). However, in the European case capital was flowing from richer to poorer economies.

Box 1: Intra-European Imbalances

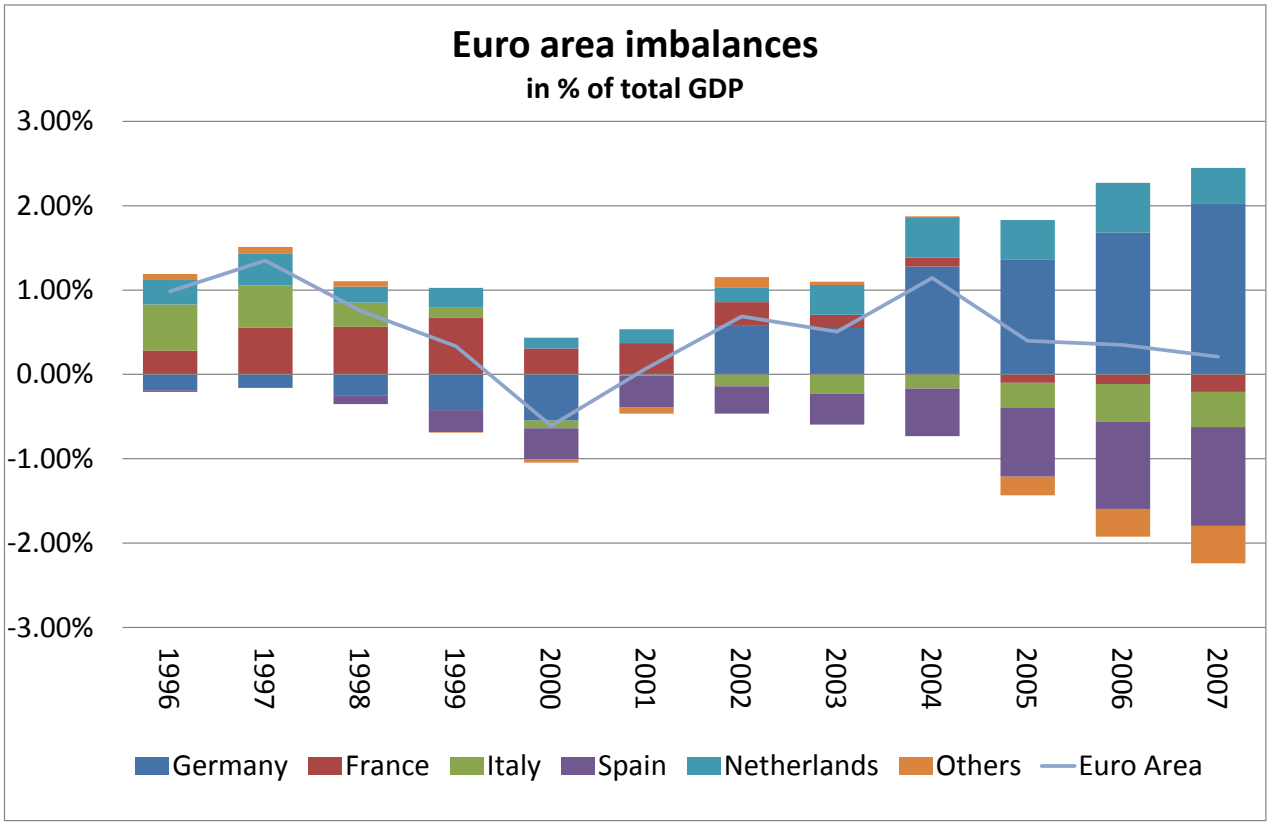
The German current account had started to increase anew in the late 90's and continued to do so under the monetary union. A strong impetus for this development came from growing demand for medium- and high-tech products in Asian and emerging markets (Shambaugh 2012). It is likely that the persistence of this development in the economically most important euro area country was to support the revaluation of the Euro soon after its introduction in 1999.

In any case the **development of effective exchange rates raised import demand in the European periphery and worsened current accounts there**. The strong exchange rate of the Euro made imports from abroad – especially from emerging Asia – substantially cheaper. This fuelled the substitution of (pivotally low skilled) production in European debtor countries with imports, a development that was to become the major factor depressing the current accounts of these economies (Chen et al. 2013). In fact misalignments of the real exchange rate increased for all euro area economies during the first decade of the Euro but the worst misalignments were observed for the peripheral economies (Coudert et al. 2013). However, much of this effect appears to be connected rather to the composition of trading partners than to hikes in unit labour costs alone (Coudert et al. 2013). In particular, it is interesting to note that most empirical studies find only a limited effect of unit labour costs for the determination of export demand across the Euro Area members (Gaullier and Vicard 2012, ECB 2012). Thus – despite deteriorating relative unit labour costs – export shares of Southern European economies on the world market remained somewhat constant or experienced only small reductions in the period preceding the crisis (Chen et al. 2013, Kang and Shambaugh 2013).

At the same time, **domestic demand in the European South was bolstered up by increasing leverage, primarily in the private sector**. As often in the run-up to crises (Reinhard and Roggoff 2009) financial sector deregulation had been a factor. The introduction of the Euro had been preceded by financial liberalisation but the relative changes in financial market regulation have been strongest in the European South. Access to credit was relaxed and competition amongst banks increased. There is evidence that this financial sector liberalisation has contributed to declining savings rates in the region (Jaumotte and Sodsriwibon 2010). The decline in savings rates (and its effect on demand and thus imports) as a result came to become the most important counter-part of current account deficits in the South of the euro area (Holinski et al. 2012). Mirror-imaging this development, capital flows from rich to poor economies within the euro area substantially increased after the introduction of the Euro (Schmitz and von Hagen 2011). These capital inflows – primarily from Germany and France – substantially contributed to private sector dissaving in debtor economies (Chen et al. 2013). As a result, while in aggregate having entangled them to

the SB market in the US, euro area economies had also tied their respective fates to one another at the eve of the crisis.

Figure 3: Imbalances in the euro area



Source: OECD Economic Outlook, own calculations.

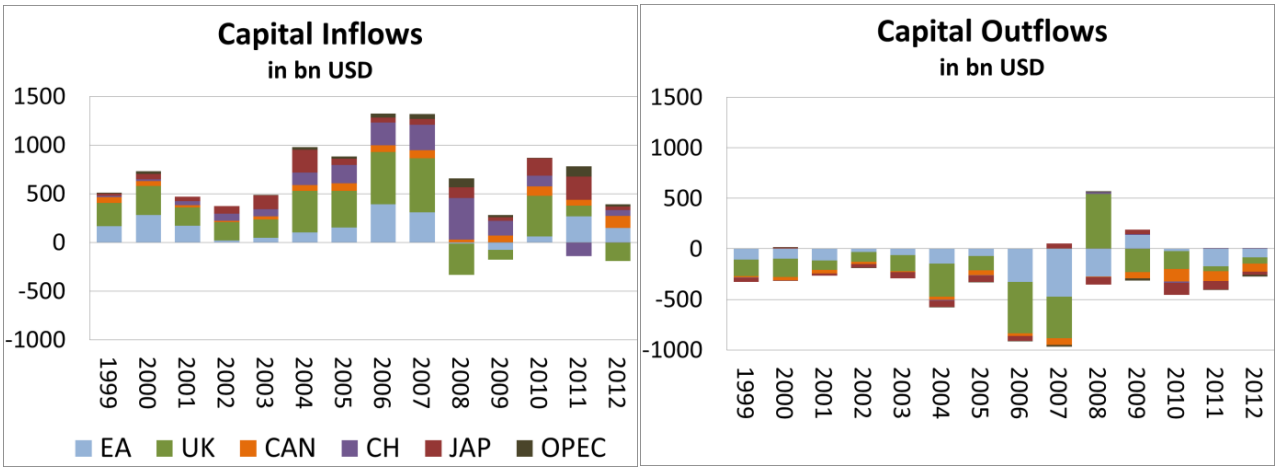
31. **Europe invested heavily in SBs in the US.** As a matter of fact, by now, there is unequivocal evidence that the foreign capital flows that were fuelling most of the demand for SBs originated in Europe not in Asia (Borio and Disyatat 2011, Bernanke et al. 2011). Consequently European investors took up increasing risks on the asset side of their balance sheets.

32. **Given that much of these investments were financed by taking up liabilities abroad** (mainly in the US)**, the net capital flows – and consequently the current account – remained relatively balanced.** In particular there was a remarkable growth in wholesale financing on the liabilities side of the balance sheet of European banks during that period (McGuire and von Peter 2009, Blanchard et al. 2011). Put differently, European investors borrowed short on money markets to finance risky assets that eventually turned out to be less liquid than some had thought. This reliance on short term interbank finance increased the speed of the dissemination of the crisis to Europe. The US, on the other hand, has borrowed long (through treasuries etc.) but (e.g. via the wholesale market) was lending short through the banking sector in aggregate (Shin 2011).

33. **Net capital inflows into the US from emerging economies contributed** to this development **by triggering crowding out effects**. As indicated above, most inflows from Asia were channelled into Treasuries, thus depressing the yield on these securities. Arguably, this induced institutional investors from Europe to search for yields (see section 4.2.) and to thus increasingly shift their capital out of Treasuries and into SBs. In fact, evidence shows that the inflow of capital from emerging markets causally reduced

interest rates of mortgage backed securities in the US (Bertaut et al. 2012). However, the rates for these securities declined even more than the federal funds rate which appears to reflect changes in preferences amongst investors as well (Bertaut et al. 2012). In the end, while the US accounted for 80% of the global SB issuance, the euro area ended up holding 40% of total outstanding asset backed securities at the eve of the crisis (Gourinchas et al. 2011).

Figure 4: Capital inflows and outflows to the US



Source: US Bureau of Economic Analysis

34. As a result, the **euro area had been utterly tangled up to the financial turmoil once the first cracks on the US mortgage market materialised**. European banks were amongst the first victims as the crisis went global and it is hardly surprising that the strongest retrenchment of capital flows took place in advanced European economies (Milessi-Ferreti and Tille 2011). The shadow banking sector – in particular money market funds – turned out to be crucial in transmitting repercussions to Europe (Bengtsson 2013). Consequently, the most substantial blow to its net international investment position in relation with asset price setbacks occurred in the euro area, next to the US (Gourinchas et al. 2011).

35. **Within Europe the** further **transmission** of the crisis **took place through** direct cross-border lending, local lending by subsidiaries of large **multinational banks and lower access of local banks to international sources** (Allen et al. 2011)[5]. It has been demonstrated that adverse shocks to external liabilities in the UK causally triggered a reduction in domestic lending (Aiyar 2012). Since many important European banks have been hit hard (Arachaya and Schnabl 2010), it is likely that this has been the case for other European economies as well. Particular problems in the euro area resulted from the fact that the introduction of the common currency had substantially increased financial integration and cross-border holdings of banks (Allen et al. 2011). Absent an area-wide backing of the financial sector – as implicitly is the case in the US – this caused massive capital-flow reversals once the crisis offset that most strongly affected the Southern European economies (Merler and Pisani-Ferry 2012). Further, the banking system in the euro area, in general, is larger than that in the US, i.e. the biggest euro area banks are way larger in proportion to their home economies than this is the case in the US (Shambaugh 2012). Using the liabilities-to GDP-ratio it can easily be demonstrated that banks which are systemic in Europe might not be systemic in the US.

[5] Note however that foreign subsidiaries in Eastern Europe actually seem to have been a stabilizing factor (Hameter et al. 2012, De Haas and van Horen 2014).

36. **The need of many countries to support** their suffering **banking industries triggered a vicious cycle of mutually reinforcing financial sector and sovereign risks**. Many banks indeed had become too big to save for their home countries. This is reflected in the negative relation between credit default swap spreads of banks and their home countries' fiscal deficits combined with a comparably low market value of the relevant banks (Demirgüc-Kunt and Huizinga 2013). The result was a vicious cycle in which national problems of the banking sector fed back to the risk assessment of public debt of the respective home countries, thereby decreasing the value of government bonds. As a consequence, the (mark-to-market) asset base of the banking sector – usually holding substantial amounts of these bonds – further deteriorated and thus perceived risks increased. This process of systemic and significant public and bank sector interdependencies can be detected for European and in particular euro area economies since (late) 2008 (Arachaya et al. 2011, Merler and Pisani-Ferry 2012, de Grauwe and Ji 2013). It apparently exhibited an intermediary phase in which causality of risk perception was running one-way from the financial sector to the public sector (Mody and Sandri, 2012).

37. The discussion in this section highlighted the ways in which the interaction of international capital flows contributed to the crisis. Net inflows from emerging Asia drove down long run interest rates in the U.S. Together with shifts in preferences and in the structure of investors (see section 2.2.1.) this prompted European investors to search for alternative investments, in particular in SBs backed by mortgages, of which a significant proportion ultimately failed. In the following section we will investigate possible reasons for households to enter into those credit contracts.

3. 3. Credit creation and inequality

38. The preceding sections have focused on market rates which have been pushed below the 'natural' level of the interest rate.[6] However, it has not been discussed thus far why excessive price growth culminated in the mortgage market. Usually, deviations from the natural rate are generally thought to yield an inflationary environment, i.e. to cause a rise in the overall price level but not to affect relative prices (Screpanti and Zamagni 2004). This is the very rationale that motivated inflation targeting policies based on the interest rate in the first place.

39. We will demonstrate below (see section 4) that structural factors have systematically increased the demand for safe assets and thereby the *demand for SBs*. The banking sector acted as a kind of catalyst that converted the rising demand for SBs into an increased *supply of credit*. While a large part of the increased demand for SBs originated in Europe, the creation of SBs – and thus the culmination of mortgage growth – primarily took place in the US and was based on credit granted to US based households.[7] However since there are always two parties to a credit contract the question remains **why an increasing number of US households voluntarily entered into mortgage contracts** that they were ultimately unable to redeem.

40. A cumulating body of literature identifies growing personal income inequality as one of the most important determinants of this development. *In short,* the argument is as follows. People's subjective well-being does not only depend on absolute consumption but also on relative levels of consumption as compared to their peers. As people commanding higher incomes tend to enjoy higher levels of

[6] It should be noted however that the 'natural' rate is flexible in principle and can be affected by factors structurally driving investment, savings and portfolio preferences and that it is very likely that the natural rate has declined substantially recently (IMF 2014).

[7] As indicated above the US accounted for 80% of the global SB issuance while Europe ended up holding 40% of these assets.

consumption those at the lower level of the distribution try to keep up by increasingly going into leverage. This maintains economic growth beyond sustainable levels. In the run up to the crisis, the result was a substantial increase in household leverage.

41. **Income inequalities increased since the 1960's across the OECD** (Alvaredo et al. 2013, see also OECD 2008, OECD 2011, Atkinson et al. 2011). Starting from the 1980's this development was paralleled by ongoing deregulation and financial innovations on capital markets (SG/NAEC(2014)2). This facilitated access to credit and helped to fuel household debt particularly in the US. Two developments stand out in this regard. It has been demonstrated that securitisation also greatly increased the accessibility of credit for subprime lenders in the US (Mian and Sufi 2009) and helped to loosen credit standards in the euro area and the US alike (Maddaloni and Peydró 2011). On the other hand, existing home-owners increasingly started to reduce saving rates and leveraged against rising house prices as manifested in soaring rates of equity withdrawals (Kluyev and Mills 2006).

42. Simultaneous to the increase in inequality **in the US[8] households increasingly went into debt**. The US ratio of outstanding debt to family income increased massively between 1989 and 2007, especially strongly at the lowest end of the distribution (Wisman 2013). However, increasing reliance on debt was not solely a phenomenon of the poorest parts of the population. Debt payments to family income culminated at rates around and over 20 percent of income for the middle layers of the income distribution in the US as well (Bricker et al. 2012). Lower household saving (and thus higher debt) was used to compensate for the reduction in income growth (Fazzari and Cynamon 2014). As a consequence, US income inequality has not translated into comparable increases in consumption inequality (Krueger and Perri 2006) a situation that can be best explained by the co-movement of inequality and debt (Iacoviello 2008).

43. **Rising income inequalities and growing household debt are not necessarily destabilizing as households might be smoothing consumption over their life cycle**. Starting from the permanent income hypothesis – formulated by Milton Friedman (1912-2006) – households are assumed to smooth consumption eventually using debt during periods in which they have smaller incomes. If this is the case household consumption would be unrelated to actual income but depended on permanent income. A case in point would be students living on loans during their studies that they eventually redeem after becoming well-paid professionals. If the part of a population that spends time in higher education increases, life-income of a larger part of the population becomes more staggered including periods of (close to) no income and periods of higher income. As a result overall income volatility would increase and accordingly, a rise in inequality could be observed. From that vintage point, increasing debt and inequality could simply be the result of more people spending longer time in education, having no or meagre incomes during these periods, but gaining access to higher incomes thereafter. Counterintuitively, growing inequality thus might even be a sign of higher social mobility.

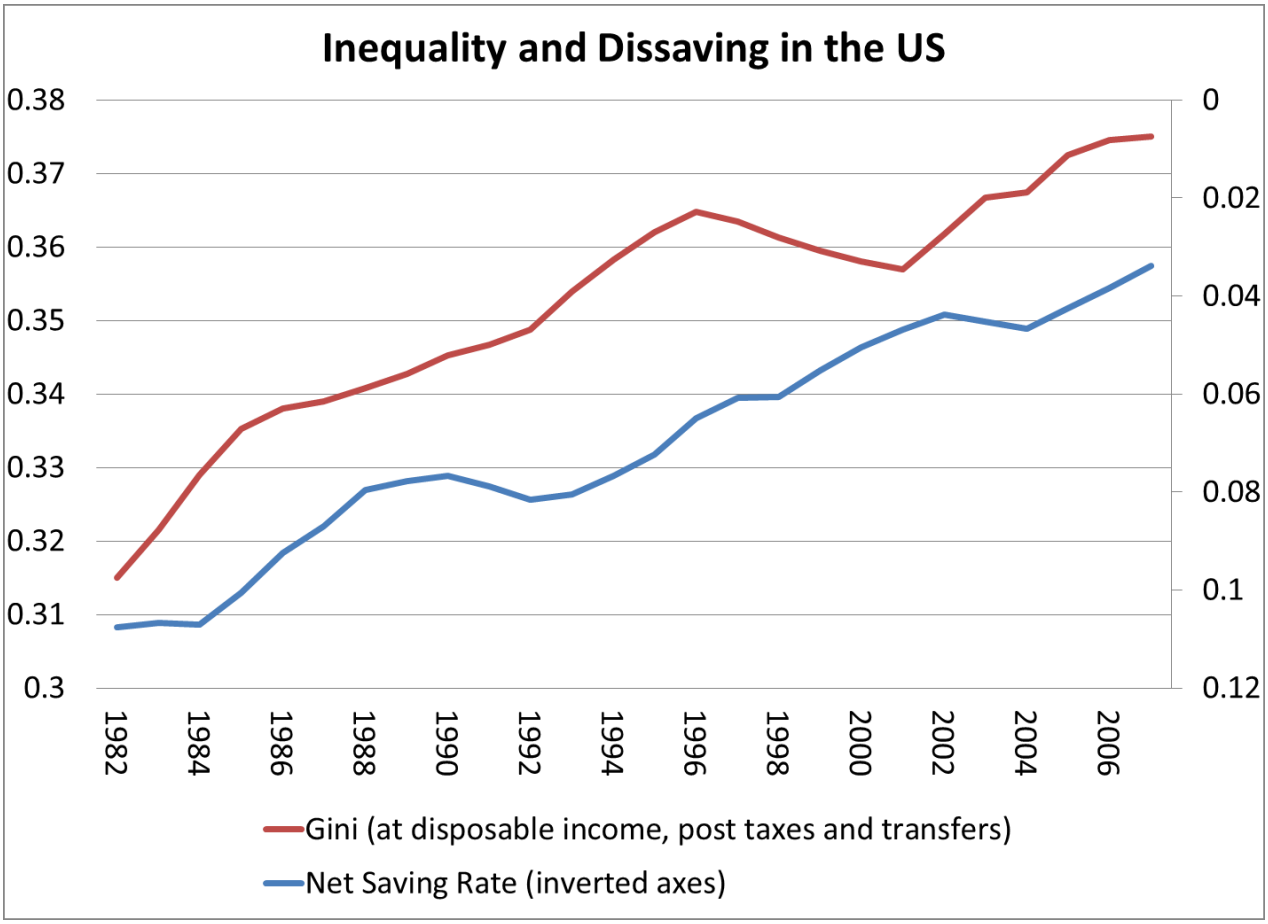
44. **A concurring explanation** identifies **conspicuous consumption and housing investment as the major reason for the rising leverage of households**. This explanation can be traced back to American economist and sociologist Thorstein Veblen (1899). Veblen argued that habits of conspicuous consumption can arise whereby consumption is used as a mean to publicly manifest power and prestige. Indeed, there is evidence demonstrating that peoples' subjective wellbeing depends on relative consumption in addition to absolute consumption levels (Luttmer 2005). Further, since the rising concentration of incomes implies an ever larger stake of luxury consumption and associated marketing activities (Osberg 2014) the likelihood of conspicuous consumption rises as inequality increases. In the run up to the current crisis thus conspicuous consumption financed by credit might have substantially contributed to borrowing. The fact that much of this activity has been channelled into the housing market has to be seen in close relation to

[8] To simplify the discussion we abstract from simultaneous housing bubbles that occurred in countries like Ireland or Spain. For possible factors triggering these bubbles see box I.

institutional factors shaping the demand on capital markets (see section 4.). Following this interpretation, increasing household debt is rather a sign of unsustainable consumption habits than of consumption smoothing.

45. An increasing body of **empirical work suggests that rising leverage ratios of households have not been due to consumption smoothing**. In particular, increasing evidence based on longitudinal data suggests that, in the last decades in the US, the increase in household income inequality has been due rather to the permanent than to the transitory component of income (Primiceri and Rens 2009, Kopczuk et al. 2010, Debacker et al. 2013). Further evidence suggests that, due to the increase in the demand for positional goods (i.e. conspicuous consumption), inequality contributed to the excessive accumulation of funds for housing (Frank 2005). US states that exhibited higher levels of inequality have been found to have higher median house prices as well as higher bankruptcy rates. These findings indicate that inequality incites large parts of the population to engage in credit-financed consumption beyond reasonable means (Frank et al. 2014). Moreover, subprime neighbourhoods experienced an unprecedented expansion of mortgage debt in the US despite sharply declining relative income growth (Mian and Sufi 2009). This is substantiated by the observation of lower denial rates in areas of fast growing credit demand during the US subprime boom (Dell Áriccia et al. 2012).

Figure 5: Inequality and debt



Source: OECD Economic Outlook and OECD Social and Welfare Statistics

46. **Growing evidence is also indicating the interdependence of inequality and increasing debt before the current crisis**. Inequality rising since the 1980s in the US caused households at the non-top part of the income distribution to progressively go into debt, arguably, to maintain or achieve elevated levels of consumption in order to 'Keep up with the Joneses' (Christen and Morgan 2005, Bertrand and Morse 2013). This is supported by the observation of a significant co-movement between inequality indicators and increases in household debt-to-GDP ratios before the recent crisis and the great depression (Kumhof et al. 2013). Of course these developments only became feasible once structural factors had led to an increased readiness of the banking sector to grant mortgages.

47. **Developments in inequality have also been invoked to explain current account imbalances.** In particular, economies with fast growing personal income inequality seem to have entered accumulating debt-ratios that stimulated internal demand and thus deteriorated the current account. In other countries, however, growth was dominated by export dynamics. Many of these economies seem to have exhibited low real wage growth which constrained overall consumption while improving international price competitiveness (Rajan 2010). Consequently, while higher personal income inequality has been linked to higher current account deficits (Kumhof et al. 2012, Behringer and van Treeck 2013), tentative evidence has associated declining wage shares with increasing current account surpluses (Behringer and van Treeck 2013).

48. It should be noted, however, that the **role of the relation between inequality and financial fragility** as observed in the **US might be a historical outlier or a new development**. For a set of fourteen countries since 1920, a systematic relationship between inequality and debt-ratios was rejected (Bordo and Meissner 2012). This is somewhat substantiated by a high level investigation of the stylised facts of a set of financial crises underlining that inequality is not a necessary condition of each financial crisis episode (Atkinson and Morelli 2010, Atkinson and Morelli 2011). Further it has been stressed that the concentration of wealth might be at least equally important (Piketty and Saez 2013). In that regard it is also worth mentioning that the reverse effect, i.e. the possibility and extent to which financial expansion can be a source of inequality is still not very well understood.

49. It also needs to be stressed that **the exact mechanism** behind the relation of aggregate income inequality and aggregate debt **is still subject to discussion**. In particular Coibion et al. (2014) identify a different mechanism – that is less behavioural and more in the spirit of very traditional New Keynesian credit rating models (Stiglitz and Weiss 1981) – in which banks use inequality as a rationing device trying to diversify high from low risk borrowers. Households that are *relatively* poorer than their local peers are considered to be of the higher risk type but not poor households in general. They substantiate this claim by presenting evidence suggesting that funds flew from high inequality regions to low inequality regions even if *all* households in the later areas were poor (Coibion et al. 2014).

50. While the discussion about the precise mechanism thus has only started the empirical picture suggests that in the US there has been a relation between income inequality and excessive credit creation in the run-up to the current crisis. On the credit supply side of the deal, this development was met by an increasing number of investors searching for high yielding assets (see 3.2.2. and 4.2.1. below). The abundance of net capital inflows alleviated the satisfaction of the heightened level of credit demand without perturbations of the exchange rate (see 3.2.1.). At the same time low policy rates induced investors to increasingly move into leverage themselves thereby fuelling risks at the liability side of their balance sheet and arguably increasing their willingness to grant credit (see 3.1.). However, an open question remains why investors and banks entered into these credit contracts if they ultimately failed.

4. THE MARKET STRUCTURE AND FINANCIAL INSTITUTIONS

51. Starting from the early 1980's financial markets experienced successive waves of liberalisation. The financial sector grew substantially in size since then and its relative importance in many industrialized economies is (still) bigger today than it ever was during the last 150 years (Philippon and Reshef 2013). In the US its size has almost doubled since 1980 (Greenwood and Scharfstein 2013). Most notably several changes in the regulatory landscape during that period enabled banks to systematically increase their leverage (Cabral 2013). Further, financial innovation began to flourish and financial markets became increasingly interconnected (SG/NAEC(2014)/2, Blundell-Wignall 2013, Lumpkin 2014). This was paralleled by the growth of institutional investors that led to a secular increase in the demand for safe asset classes. At the same time the desire to compensate for relative income losses increased the demand for mortgages (see section 3.3.). Against the backdrop of the low interest rate environment, the obligation to primarily invest into safe assets was the only barrier left that prevented institutional investors from investing into the mortgage market. This barrier cracked when financial innovation enabled the generation of financial products secured by mortgages. The regulatory environment failed to put a stop to these developments.

52. These developments are discussed below. First, the following section will investigate the rise of institutional investors and their effect on the structure of demand for financial assets. Then structural shortcomings with regard to rating models, incentives of market participants and risk management will be analysed. These institutional determinants set the stage for the rapid rise of shadow banking and securitised bonds (SBs) that destroyed the barriers between institutional investors and the mortgage market. In the final section, this chapter will analyse the reasons why the regulatory environment failed to provide an effective back-stop.

4. 1. The secular rise of institutional investors and the structure of demand

53. *In short* ageing, the increased concentration of wealth and substantial increases in the liquidity preference of corporations fuelled the growth of institutional investors' cash funds and thereby fundamentally changed the structure of demand for financial assets. This led to two major developments. On the one hand, it triggered a search for yield. On the other, the demand for deposit-equivalents was constantly growing due to the cash-management requirements associated with ever increasing capital stocks of institutional investors. These developments pushed up the demand for highly rated assets such SBs considerably.

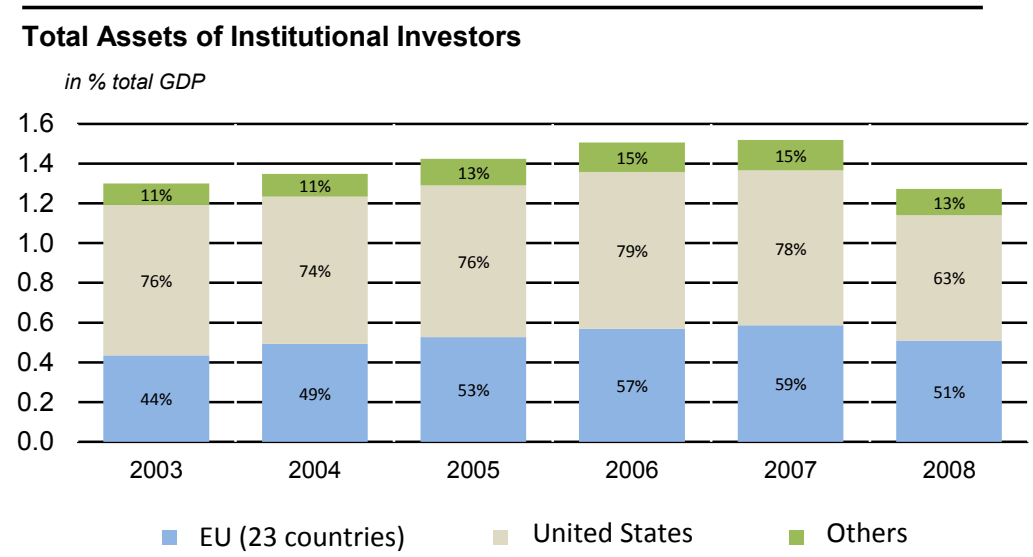
54. **The first factor that triggered the rise of institutional investors was an increasing shift towards capital-based pension schemes.** Recent decades have sifted attention to the looming problems the ageing of the baby-boom cohort of the 1940s and 1950s poses for countries relying on state-financed 'pay-as-you-go' pension systems (OECD 1998, Lumpkin 2014). This has given major impetus to the introduction of advance-funded pension schemes in numerous countries and to alternative long-term saving vehicles in others. A substantial accumulation of pension funds was the result.[9]

55. **Old age procurement** also **is likely to have increased current accounts in ageing societies**. Thus it might have contributed to current account developments (see section 3.2.) as ageing societies accumulate pension funds that are increasingly invested abroad. Growing institutionalised savings in OECD countries, in line with population ageing, have been increasingly directed towards cross-border

[9] In 2011 pension fund assets in the OECD reached USD 20.6 trillion with a weighted average asset-to-GDP ratio of 73.8% (OECD 2013b).

portfolio investments (Committee on the Global Financial System 2007). Indeed, it is a pretty standard finding in the current account literature that a higher projected dependency ratio increases the current account, which is supported by evidence for OECD (Barnes et al. 2010) and a broader set of 49 countries (Jaumotte and Sodsriwiboon 2010). Demographic trends have thus contributed to the evolution of the current accounts of the US, Japan or Germany (Cooper 2008). Explanations for excess savings of China also have been related to the need to save for old age procurement (Jagannathan et al. 2013).

Figure 6: The growing importance of institutional investors in the OECD



Quelle : OCDE.

Note: Country sample includes Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, France, Greece, Hungary, Iceland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Turkey, UK and US. No comparable sample size is available before 2003.

Source: OECD, Institutional Investors Database

56. **The second factor contributing to the rise of institutional investors was the increase in inequality** (see section 3.3. and Poszar 2011). Two aspects are relevant in this respect. First, as evidence for the euro area suggests, richer households are more likely to hold financial wealth in the form of risky assets such as mutual funds, bonds or shares (Arrondel et al. 2013). Consequently, an increased concentration of wealth, *ceteris paribus*, implies that the share of wealth held with institutional investors such as mutual funds is higher. Second, as is suggested at least for the US, richer households tend to have a higher savings ratio (Dyan et al. 2004). Indeed, recent evidence suggests that the increase in the concentration of wealth amongst the richest parts of the population has contributed to the low interest rate environment (Goda and Lysandrou 2014).

57. Distributional developments also have been linked to current accounts. Low and middle income households (see section 3.3.) reduced their saving rates and increasingly went into debt a development that has been associated with conspicuous consumption due to increasing inequality which stimulated consumption (Behringer and van Treeck 2013). Therefore the aggregate effect on consumption apparently exceeded the negative effect of the higher savings rate at the top. This is suggested by the finding of a negative effect of personal income inequality on current accounts (Kumhof et al. 2012, Behringer and van Treeck 2013, see also paragraph 46). In any case the higher savings of top incomes formed the counterpart of the higher debt levels of incomes at the bottom of the distribution thus contributing to the increase of debt-to-GDP ratios (Kumhof et al. 2012).

58. **Finally – as a third factor – the structural increase in liquidity preference of corporations also contributed to institutional cash holdings.** In fact, the secular increase in corporate short-term savings has been a much discussed issue in the last decades and has been investigated by the OECD at an early stage (André et al. 2007).[10] In particular, the cash-to-asset ratio rose considerably (with the definition of cash including cash holdings in shadow banking instruments, as discussed in section 4.2). This is mainly the case for U.S. firms (Bates et al. 2009) but to a smaller extent has also occurred outside the US (Pinkowitz et al. 2012). In any case mainly highly profitable large firms have been engaging in that practice (Hodrick 2013). The reasons for this development are still subject to discussion that is almost exclusively focused on the US. One reason for this development has been traced back to managerial conservatism (Dittmar and Duchin 2012) but also a relation between the knowledge intensity (and thus the propensity to innovate) and cash holdings has been established (Lin 2014). This later finding fits to the observation that technology intensive firms hold more cash (Foley et al. 2007). Further firms facing high costs of repatriating profits tend to have large cash holdings (Foley et al. 2007) as well as firms whose investment position is less strongly diversified (Duchin 2010). Recently increased attention has been shifted towards the relation between agency problems and cash holdings with increasing evidence that firms with larger agency problems tend to have higher cash reserves (Nikolov and Whited 2013, Gao et al. 2013).

59. **On the one hand, the rise of institutional investors intensified the search for yield** (see section 3.1. and 3.2.). For some investors, this might have been motivated by contractual obligations especially against the backdrop of the low interest rate environment. Defined benefit schemes for instance still account for 60% of all pension assets in the OECD (Yermo and Severison 2010). It is likely that, for some of these schemes[11], the secular decline in interest rates increased the net present value of estimated future pension payments, and thus added to the pressure to earn higher returns (Lumpkin 2014). Insurance companies are also affected by low rates (Antolin *et al.*, 2011) and can face longer-term problems associated with obligations under guaranteed savings contracts to pay out fixed rates of return to clients.

60. **On the other hand, the rise of institutional investors triggered large cash holdings and thus increased the demand for large scale deposit-equivalents** (Claessens et al. 2012).[12] A simplified interpretation of these funds is that they are the result of the flows associated with investment activities. For instance, selling one asset and holding the proceeds in cash before eventually acquiring another, increases institutional cash holdings and thus the necessity for deposit equivalents. There also might have been changes in overall liquidity preference (as e.g. for corporations). In any case, institutional cash pools have grown by a factor of 30 over the past decade (Claessens et al. 2012). According to survey data, the investment priorities for these funds are primarily focused on safety and liquidity (Poszar 2011). However, institutional investors typically command very large sums and the absolute amount of deposit insurance is limited.[13] Given the limited applicability of deposit insurance and the investment priorities of institutional

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10 According to Claessens et al. (2012) corporate short term savings have increased from 50 billion USD in 1990 to 750 billion USD in 2007.

11 For funded pension schemes, for example, the level of funding required depends on how assets are measured and how "accrued benefits" are defined. The decline in rates would boost returns on existing bond portfolios, but the extent to which these increases would cover the rise in liabilities would depend on various factors, including the percentages of plan assets held in equities versus bonds, the specific stocks and bonds held, and the average duration of the bonds (Lumpkin 2014).

12 Based on the cash holdings of S&P 500 constituents, the holdings of liquid assets by long-term funds and the cash in securities lenders' cash accounts, Poszar (2011) quantifies their size – for the US – with a downwardly biased estimate to 2.2 trillion USD at the peak of the crisis but suggests that they might have been as large as 3.8 trillion USD.

13 In the US it stood at 100.000 USD per depositor per bank at the eve of the crisis.

investors, a natural place to temporarily store large cash pools would be Treasury Bills (Poszar 2011). With the supply of Treasury Bills – being limited, financial innovation finally opened the possibility to satisfy this large demand. This paved the way for the rise of the shadow banking sector (see section 4.2.).

61. Summing up, several developments such as the shift to capital-based pension schemes and the increased concentration of wealth led to the constant rise of institutional investors.[14] The increase of institutional cash holdings was further fuelled by the secular increase in the liquidity preference of institutional investors. Against the background of low interest rates, these developments intensified the search for yield. Further, the existence of large institutional cash holdings necessitated large scale deposit-equivalents. However, many institutional investors such as pension funds and insurance companies are obliged to constrain their investments to safe assets. The question remains how they ended up investing in assets that turned out not to be safe at all? In fact several financial market developments led to a structural miss-assessment of the risks associated with certain asset classes.

4. 2. Shadow banking[15] and the decisive spin to capital flows

62. *In short* the search for yield as well as the management requirements of the vast amounts of cash under control by institutional investors increased the demand for safe assets. This increase in demand appears to have triggered the very production of such assets (Cabalero 2010, Cabalero and Krishnamurthy 2009). In fact securitisation soared and in combination with shadow banking activities made the hitherto unthinkable possible: the generation of high yields without the necessity to accept higher risks. At least this was the general impression before tail risks materialised. Key innovations on financial markets flagged this development.

63. **The appearance of highly rated SBs enabled institutional investors to comply with their legal frameworks when investing into the mortgage market**; directly or indirectly. To continue the analogy from the introduction, the appearance of highly rated SBs (and the products based on them such as repos, commercial paper or money market funds) was the payload that burst the locks between institutional investors and mortgage markets open. These developments somewhat replied to the structural changes concerning the patterns of demand for financial assets namely the search for yields and the increased demand for deposit-equivalents (see section 4.1.).

64. **First, SBs helped to satisfy the search for high yields by enabling some institutional investors to directly invest into the mortgage market.** This is reflected by the fact that the SB-holdings of institutional investors grew considerably before the crisis. While detailed data on a complete set of institutional investors unfortunately is not available, the direct SB-holdings – mainly triple A assets – of US-based insurance companies and mutual funds increased fourfold since 1998 and amounted to almost 2 trillion USD at the eve of the crisis in 2007 (Manconi et al. 2012).

65. **Second, and most importantly, the rise of SBs helped to satisfy the increased need for deposit-equivalents triggering the rise of the shadow banking industry.** This term refers to an industry

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[14] The argument about institutional investors developed here focuses on the long run shift in demand and its impact on the production of certain asset classes. It should be noted, though, that during the initial stages of the crisis, most institutional investors (in particular insurance and pension funds) exhibited a stabilising role. This was due to their long term investment horizons that led them to hold on to certain assets even as they were fire-sold by others (Manconi et al. 2012, White 2014).

[15] There is still no universally accepted definition of shadow banking. Usually the term refers to activities including some form of credit, liquidity and maturity transformation without access to the traditional credit and liquidity backstops available to the banking system (e.g. the discount window) (Claessens et al. 2013, Poszar et al. 2013).

that effectively conducts a term transformation such as traditional banks thus converting short term deposits into finance for long term assets. The term shadow stems from the fact that the involved institutions – while somewhat acting like traditional banks – have no access to a lender of last resort nor are they subject to the same regulatory provisions as banks. The sector rose rapidly since the end of the 90's and was mainly funded by institutional investors like fixed income mutual funds, pension funds, and insurance companies (Poszar et al. 2013). The industry was to provide safe investment opportunities since usually some form of collateral based on SBs and guarantees was provided.

66. **Trust into the shadow banking instruments – repos, commercial paper and money market funds – was created by a combination of SB-based collateral and guarantees** (for a detailed discussion see box 2). Shadow banking instruments, backed by SBs and guaranteed by the sponsoring institutions, appeared as large-scale substitutes for deposit insurance. Repos, for instance, worked similar to short running fixed-term deposits. They provided investors with the promise to receive a certain amount of cash in the future and with collateral based on SBs in case of a failure of the counterparty. Asset-backed commercial paper also offered short-term investment opportunities. But, in addition to the collateral implicitly provided by the underlying SBs, they were also guaranteed by special purpose vehicles and thereby in most cases ultimately by the parent banks of these entities. Finally, Money Market Funds (MMFs) promised to take their shares back at least at face value and were implicitly guaranteed by their parent institutions (usually banks) as well. However, a large and growing proportion of MMFs mainly invested in SBs. The term transformation effectuated by these instruments consequently exposed them to the same liquidity risks as traditional banks. However, there was no public deposit insurance, nor a lender of last resort. Trust thus crucially depended on the belief that the involved SB-based collateral was valuable and that the engaged institutions were stable.

Box 2: The structure of Shadow Banking:

Shadow banking played a crucial role in providing an indirect channel for institutional investors to hold mortgages. Based on increased securitisation and through the invention and rapid rise of 'structured' finance three key innovations took place providing seemingly safe deposit-equivalents that are described below in more detail.

First, **the repo market was the most important indirect channel into the mortgage market**. This market has grown considerably in the last two decades[16] (Gorton and Metrick 2012). In a repo transaction,[17] depositors provide a bank with funds and in exchange receive collateral[18] – usually some form of SB – as well as the bank's guarantee to repurchase the collateral at a specified future date for a specified, higher price. The difference between purchase price and repurchase price mimics the interest

16 While exact data on the size and development of the repo market unfortunately is unavailable, there is plenty of evidence that the repo market is very large and has substantially grown in the last two decades (see Gorton and Mertrick 2012 for a succinct overview). According to Hördahl and King (2008) an incomplete account of the repo market in the US (including double counting of repos and reverse repos) suggests that the market still had a capitalisation of 10 trillion – roughly 70% of US GDP – at the beginning of 2008. More exact data for the euro area suggests that the repo market accounted for 65% of the GDP of the area in 2008 and had doubled in size in the preceding six years.

17 See Blundell-Wignall and Roulet (2013) or Gorton and Metrick (2010) and (2012) for an illustrative description of the functioning of repos.

18 Note that this collateral can be reused by the institution that receives the collateral to a limited extend in the US and to an unlimited extend in the UK. This has given rise to a re-hypothecation process (Singh and Aitken 2010) during which several credit transactions might be executed on the basis of one collateral

rate. The collateral is a substitute for deposit insurance but also applicable to larger transactions. In the case of a default of the bank, the depositor is free to sell the collateral. Ignoring tail risks, repos could thus appear as a functional equivalent of insured deposits. However, as soon as doubts about both, the stability of the issuing bank and the value of the underlying collateral arise simultaneously, all ingredients for a traditional bank run are present. Indeed, the outbreak of the crisis is marked by a measurable increase in both, counterparty risk and uncertainty about the value of the underlying collateral (Gorton and Metrick 2010).

Further, the market for **asset-backed commercial paper was the second indirect channel**.[19] Commercial paper is issued by conduits – special purpose vehicles – that, to the largest part, were owned by commercial banks but situated off their balance sheets. While commercial paper, by definition, is of a short term nature and has a maturity below one year, conduits started to increasingly invest in long-term assets – in particular SBs – at the end of the 90's (Kacperczyk and Schnabl 2010). Most of the paper issued by conduits is guaranteed by sponsoring institutions. The vast majority of the involved guarantees were in the form of liquidity guarantees. These guarantees are not binding in the case the involved conduit defaults and thus do not increase regulatory capital requirements for the sponsoring banks. However, the default of conduits usually was effectively ruled out in practice by the way the default event was defined (Acharya et al 2013), thus guaranteeing high ratings on the created commercial papers. This economic dependence has been underlined by the significant negative relation between conduit exposure and stock returns of the sponsoring banks that would not have been observed if the involved guarantees had not been considered as binding on the markets (Acharya et al 2013). The underlying economic reality, thus, was that banks accepted higher risks but were able to avoid the associated increase in regulatory minimum capital.[20]

On the investor' side, this development was most significantly reflected in the rapid rise of Money Market Funds (MMFs) (McCabe 2010) since the end of the 90's (Brennan et al. 2009).[21] While being institutional investors themselves, MMFs also participated in transforming short term deposits into long term assets and thus simultaneously acted as shadow banks. They promise to take their shares back for face value[22] at minimum, thus providing yet another form of a private sector equivalent to deposit insurance. Some MMFs are restricted to Treasuries but the substantially largest part of MMFs invests in a broader set of assets that has to be classified as being safe (McCabe 2010). Curiously, thereby, MMFs turned out to be primarily holding assets that in some form were related to the mortgage market.[23] After they experienced the first problems they were still supported by their sponsoring institutions. This made them appear even safer and their assets more than doubled within a year (Kaperczyk and Schnabl 2013). However, in August 2008 – after the Lehman collapse – the first MMF turned out to be unable to take back its shares at face

asset. This is somewhat similar to the money multiplier also giving rise to a velocity of circulation of collateral (Gorton and Metrick 2010).

19 Kacperczyk and Schnabl (2010) note that the commercial paper market had grown from 568 billion USD in 1990 of which 5.7% had were asset-backed commercial paper to almost 2 trillion USD of which 56.8 were asset-backed commercial paper.

20 It is noteworthy that special purpose vehicles already had played a very notorious role in the spectacular insolvency of the infamous US company ENRON at peak of the dot.com bubble (Elkind and McLean 2013).

21 These funds were holding assets worth of 1,7 trillion USD at the eve of the crisis in January 2006 (Kacperczyk and Schnabl 2013).

22 As jargon has it, they guarantee "not to break the buck".

23 In 2009 they were holding 44% of all outstanding debt issued by government-backed mortgage sponsoring institutions such as Fannie Mae or Freddie Mac (Brennan et al. 2009). Further they held 39% of all outstanding commercial papers and 23% of all repurchase agreements (Brennan et al. 2009) both asset classes again are strongly related to SB.

value. A virtual run on MMFs was the result. The run on MMFs also was crucial in the dissemination of the crisis to Europe since MMFs were the first institutions to be affected and quickly triggered troubles for their sponsoring banks (Bengtsson 2013).

67. After the first problems on the subprime market materialised, **trust in SBs** though **deteriorated quickly, triggering fire sales and the modern day equivalent of a bank run**. At the peak of the crisis, it became clear that the substitutes for deposit insurance created by SBs did not provide the warranted protection against tail risks. Put differently, what was considered to be a functional equivalent for deposit insurance turned out to be dysfunctional. However, instead of a direct run on commercial banks, there was a run on repos[24] (Gorton and Metrick 2012), a run on money market funds[25] (McCabe 2010), in direct relation to that a run on commercial paper[26] (Kacperczyk and Schnabl 2010) and as a result, the threat of a run on wholesale markets altogether. Once the crisis had reached this point, banks – particularly those relying on larger amounts of wholesale funding – found themselves at the brink of disaster, finding it increasingly difficult to roll over their short-term debt positions. This was particularly problematic from a European perspective. While deposits with US banks received a boost due to the run on money market funds, this was not the case for European banks – that actually had relied most strongly on the wholesale market (Baba et al. 2009). This quickly spread the crisis to Europe.

68. **Trough securitisation,** some of the **worst risks** were left **on the balance sheets of banks and losses were immediately signalled to markets, thus aggravating the panic.** First, as soon as trust in SBs eroded and investors moved out of the market, the securitised and hence tradable nature of the involved claims allowed their prices to immediately plummet. This meant that SBs could and did loose in value even before the underlying mortgages had failed. Together with fair value accounting, this guaranteed that losses were realised on banks' books even before credit events had occurred (Borio et al. 2010). Second, institutional investors were mainly interested in highly rated SBs (Manconi et al. 2012). As a result many banks held large amounts of SBs with low or very low ratings on their balance sheets as a by-product of the securitisation process. This further accelerated the deterioration of their balance sheets (see also section 3.2.).

69. Summing up, the creation of deposit equivalents that involved the systematic production of highly rated collateral directed institutional investors' funds into the mortgage market. Eventually, long term investments were financed with short term funds, but without the involved institutions being subject to standard regulatory requirements or having access to a lender of last resort. The creation of these new financial instruments interacted with the rise of institutional investors. Thereby, banks helped to channel funds into the mortgage market and flawed incentives and insufficient risk management made them ignorant with regard to the potential long-term implications of their behaviour for themselves. The reasons for this behaviour will be discussed in the next section.

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24 Gorton and Metrick 2012 locate the start of this run to September 2007. The process speeded up in July 2008 with repo haircut rates progressively rising to close to 50% towards the end of 2008.

25 In the case of the run on MMFs the fall of Lehman Brothers and the associated losses that caused the Reserve Primary Fund (a big MMF) to notoriously `break the buck` on September 16, 2008 was the trigger event for the run on MMF. The announcement of the U.S. government that it would provide deposit insurance to investments in MMFs on September 19, 2008 finally stopped the run (Kaperzcyk and Schnabl 2008)

26 The run on commercial paper continued beyond the run on MMFs forcing the Fed to start to directly purchase commercial paper starting from October 26, 2008 onwards and continuing way into 2009.

4. 3. Securitisation, flawed rating models and weak governance

70. While a number of developments on the side of demand for financial assets led to the rise of SBs, the structure of the supply side was crucial in their creation as well. The originators of SBs contributed massively to the accumulation of excessive risks while, at the same time, hopelessly entangling themselves to them. *In short,* insufficient risk management and flawed incentives induced bank managers to expose themselves to excessive risks. Rating agencies that used rating models insufficiently adapted to the requirements of the new markets contributed to this trend.

71. **The securitisation of mortgages helped to meet the structural changes in the demand for financial assets by creating assets with high ratings.** It is noteworthy that while the share of assets-to-GDP has grown fourfold since the Second World War, the ratio of safe assets to total assets has remained roughly constant, if and only if SBs are counted in (Gorton et al. 2012). This suggests that SBs – the most important financial innovation of the recent decades – have been largely created to meet the demand for safe assets. Securitization thereby facilitated the metamorphosis of risky mortgages into highly rated SBs. Many SBs were 'structured' in a way that bundled different sets of mortgages into one tradable security. Pay-outs on these securities were prioritised. Consequently, securities received different ratings including large tranches of securitised mortgages with highest ratings. This process greatly helped to channel funds into the housing markets. In fact, securitisation also increased the positive effect that capital inflows exhibited on housing demand (Sà et al. 2011). It is clear that many buyers lacked sufficient information or the capacity to understand the riskiness of some of the new products or how these risk positions would likely evolve under different scenarios. [27]

72. **Failures in rating models tacitly changed the information value entailed in the rating scales when applied to SBs.** Rating agencies had been primarily concerned with the rating of single-name corporate finance. However, in the run up to the crisis they started to increasingly rate SBs, by applying[28] a similar rating methodology and the same ordinal scale (i.e. AAA ratings etc.) as for corporate bonds, thus effectively pouring new wine in old bottles. In fact, in addition to the probability of default of the underlying loans, the creation of most SBs involved assumptions about the joint probability of default of these assets.[29] This, of course, increased the potential for making mistakes. Moreover, slight errors in assumptions about the correlation of default-probabilities could cause a disproportionally large underestimation of risks (Coval et al. 2009b). Even worse, this effect was particularly pronounced for exactly those tranches of structured SBs that had received the highest ratings. Furthermore, failures to adequately assess the quality of the underlying assets affected ratings in a non-linear way, thus substantially increasing the probability of strong downgrades as e.g. compared to a corporate bond implying that the way from investment to junk grade was quicker (Fender et al. 2008, Fender and Mitchell, 2005). On top of that, since many of these products due to their high rating were used as collateral, the correlation of their respective market prices increased due to the possibility of contagious fire sales during credit events (Coval et al. 2009a).

73. **Banks also used guarantees to generate high ratings and thus accepted high tail risks on their own balance sheets.** This, however, was often done by-passing the involved capital requirements

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27 To have a reference value, note that according to data by the Securities Industry and Financial Market Association (2014), the total amount of mortgage-related and asset-backed bonds in 2007 stood at approximately 13.5 Trillion USD (SIFMA 2014).

28 To give a reference value of the importance of the business according to Coval et al. (2009b) in 2006 44% of the revenues that Moody's reported were associated to rating structured finance products (that is some form of SBs) while only 32% of the revenues came from the traditional business of rating bonds.

29 This means that they required assumptions in how far the probabilities of default were correlated across asset classes, e.g. across the different mortgages included in a structured SB.

(see section 4.2. and in particular box 2). The tail risks – improbable but possible extreme loss events such as the joint failure of the loans underlying an SB – that are thereby accepted are easily overlooked by outside investors. However, risky assets have higher yields. As a result, tail risks might be used to give the appearance of higher profitability when in reality only the volatility of profits has increased. Put differently, it is more likely that a bank sells securities if they have a high rating. Thus, flawed incentives induced banks to extensively use guarantees hedging investors against tail risks in order to boost short-term provision income.[30] Indeed, it has been demonstrated that taking tail risks can be associated with higher stock returns during a period of one month up to five years in the US stock market (Kelly and Jiang 2013). This is substantiated by the fact that those banks that had the highest stock returns in 2006 turned out to have experienced the worst slumps during the crisis (Beltratti and Stulz 2012).

74. **Flawed incentives for CEOs contributed to this excessive risk taking**. Evidence for the US shows that those CEOs whose interests where better aligned with those of the shareholders via the extensive use of share options in the compensation package of top management performed worse during the crisis (Fahlenbrach and Stulz 2011). Generally a higher share of options and bonuses was correlated with excessive risk taking in the run-up to the crisis (Cheng et al. 2009). As a result the guarantees in question were priced too cheap and that the risk premium charged for these securities was too low (Coval et el. 2009a).

75. Further **insufficient risk management practices made the disastrous accumulation of risks on both sides of banks' balance sheets possible**. Anecdotal evidence suggests that the standing of risk managers in the run up to the crisis was very weak (Kirkpatrik 2009, Rajan 2010). This is unfortunate since evidence – again from the US – shows that banks with better risk-management structures in terms of independence and standing fared substantially better during 2007 and 2008. Even when looking at longer periods such as that ranging from 1995 to 2010, these banks exhibited a superior performance. In particular, they had lower tail risks, smaller fractions of non-performing loans and higher returns (Ellul and Yerramilli 2013).

76. **The promotion of SBs can also be partly explained by the originate-to-distribute model.** This model allowed banks to originate risky credits that subsequently could be sold and thus unloaded from their balance sheet. This is also underlined by the finding that the quality of loans originated in banks with a high involvement in originate-to-distribute activities indeed was systematically lower in the US at least since 2006 (Purnandam 2011)[31]. Nonetheless, even banks that extensively relied on the originate-to-distribute model ended up distributing substantial amounts of the risks to themselves while financing these assets with short term liabilities (Kashyap et al. 2008). Partly, this is explained by the fact that they needed collateral for repo activities (see Box 2 below) (Gorton 2010).

77. This – possible – **separation of mortgage originators and ultimate investors further fuelled the promotion of dubious lending practices**. In many cases, mortgages were not originated by banks but by so called mortgage brokers, that acted as independent entities on behalf of banks earning fees for originated mortgages. These appear to have aggressively promoted mortgages beyond sustainable levels. It has been demonstrated that the delinquency rates of mortgages originated by such entities has been 50% higher than that of mortgages originated by the banks themselves (Jiang et al. 2009). Hereby, loans that can be associated with higher broker profits were more likely to fail during the crisis (Berndt et al. 2010). This arguably was one of the major reasons for the explosive growth of subprime mortgages in the run-up to the

30 As early as 2001 Allen and Santomero noted that banks had increasingly replaced their traditional business model – in which earnings are produced by interest differentials – with fee-producing activities. These include trusts, annuities, mutual funds, insurance brokerage, transaction services and – most notably – mortgage banking, i.e. the brokerage of mortgages.

31 No relevant data exists for the period preceding 2006.

crisis. Indeed, the quality of loans deteriorated almost in parallel to their explosive growth in the six years before the crisis, though this was not accounted for by an increasing mark-up on loans rates (Demyanyk and Van Hemert 2009).

78. Summing up, securitisation combined with structural failures in rating models and governance problems in the financial sector led to the systematic miss-assessment of risks. Even worse, the hunt for high ratings led banks to entangle themselves systematically to tail risks. These developments were triggered by flawed incentives of CEOs and insufficient risk management models. Still, the question needs to be answered why regulators did not act as a backstop against this development. This will be addressed in the next section.

4. 4. Loose regulation[32] and distortionary taxes

79. It has been discussed above how in the run up to the crisis large internal and external imbalances and specific developments on financial markets have acted as whip of allocative failure. Still, the regulatory environment and the tax regime could have acted as a leash; but they did not. Some suggest that – given the underlying macroeconomic forces – financial innovation would have found a possibility to bypass financial regulation anyhow (Jagannathan et al. 2013). Nonetheless, it has been demonstrated that financial deregulation has regularly preceded major crisis episodes in the past (Reinhard and Rogoff 2009).

80. Cross-country evidence clearly suggests that **countries with a low level of credit market regulation experienced a higher likelihood of being hit by financial market turmoil** during the current crisis (Rose and Spiegel 2011, Giannone et al. 2010). Further, a weak supervisory and regulatory environment contributed to elevated leverage ratios in the run up to the current crisis (Merrouche and Nier 2010).

81. The **regulatory changes of the 1980s and the 1990s allowed financial institutions to increase their leverage** and to develop a more fragile liquidity structure (Cabral 2012). Efforts that have been targeted to increase competition in the banking sector might thus have contributed to excessive risk taking and instability (Eichengreen 2008). In particular indices of regulatory strictness are negatively related to the effects of a country's capital inflows on housing markets, suggesting that excessive financial innovation might have acted as a propagation mechanism in the run-up to the crisis (Sá et al. 2011). Further, the combination of increased securitisation and loose oversight helps to explain the loosening of credit standards (Maddaloni and Peydró 2011). In this context it is interesting to note that the behaviour of asset prices and leverage among broker-dealers – probably the most stressed financial institutions during the current crisis – has been strongly pro-cyclical (Adrian and Shin 2010). As asset prices rose these institutions increasingly went into leverage, exposing themselves to higher risks in the case of an unfavourable economic environment.

82. **Changes in regulatory weights for minimum capital attached to mortgages have been crucial in this process**. In fact, while the regulatory standards of Basel II had not been generally implemented when the crisis started, investment banks in the US were allowed to use the Basel II risk weight requirements starting from 2004 onwards (White 2014). These requirements reduced the capital weight given to mortgages from 50 to 35 per cent and to as little as 15-20 per cent if internal ratings had been applied (Blundell-Wignall and Atkinson 2008a). The result was a huge run-up of leverage ratios – not even including off-balance sheet exposures – of investment banks that culminated in a substantial slump in

[32] The debate on the role of financial regulation in the run up to the crisis and the scope for financial reform is prolific. Covering this discussion in depth exceeds the scope of this paper, especially since authoritative work in this regard already was done at the OECD (White 2014). The reader is also referred to more concrete proposals for regulatory reform (Blundell-Wignall 2008, OECD 2014b).

2008 (Kalemli-Özcan et al. 2011). That this was problematic is underlined by the finding that banks holding higher levels of Tier 1 capital, more deposits and more loans performed better during the early stages of the crisis (Beltratti and Stulz 2009).

83. **Regulatory arbitrage was an important factor in driving up the off-balance sheet exposure of banks.** The quick rise of off-balance sheet conduits that were effectively guaranteed by banks but circumvented regulatory constraints indicates that regulatory arbitrage played a crucial role in the build-up of excessive exposure in the shadow market (Acharaya et al. 2013). These loopholes in the regulatory framework show that the reaction of regulators to financial innovations had been inadequate. There are several reasons for the inadequate regulatory response to uprising risks.

84. First, **regulators were focusing on the health of individual financial institutions, without having a good understanding of the system as a whole**. They were not able to fully grasp the growing complexity of financial products or the complexity resulting from the growing interconnectedness between financial institutions. Further, they relied on models based on historically low mortgage default and delinquency rates leading to an underestimation of risk (Brunnermeier 2009).

85. Second, **bank lobbying has been extremely intense and successful in bringing about a 'light' touch in regulation**. In the current crisis, institutions that participated in lobbying activities related to mortgages were likely to accept higher loan to income ratios, they had a greater tendency to securitise and had a faster growing mortgage portfolio (Igan, Mishra and Tressel 2009). Lobbying by the financial industry also played a role in the crisis resolution legislation in the US (Mian, Sufi and Trebbi 2010). In Europe the process seems to have been more strongly influenced by an interaction of frameworks set by the European commission and political partisanship on a national side with coalition governments likely producing larger banking packages (Weber and Schmitz 2011). To a great extent, it can explain the aversion to recognise the magnitude of possible bad loans and unwillingness to make lenders pay for having made such bad loans. Regulatory capture can also explain that regulators believed that banks' risk control systems dealt adequately with tail risks, or bought into the argument that higher capital requirements would *de facto* lead to less lending and lower growth (White 2014).

86. Finally, another major impediment to the adequate regulatory response was the **lack of coordination across various jurisdictions** and the difficulty of addressing global systemic risks from a domestic regulation standpoint. With the presence of banks acting globally, emerging tail risks have thus not been adequately addressed (Acharya and Schnabl 2010). Different regulatory regimes might have also contributed to the geography of the crisis. European banks for instance had a strong exposure to asset-backed securities (Bernanke et al. 2011) and thus suffered substantially from the crisis (Acharaya and Schnabl 2010). This might have been due to the fact that European regulators had more trust in Basel II than US regulators, triggering looser discretionary oversight (Shin 2012).

87. There was also an **interaction between the activities of government sponsored entities and regulatory arbitrage**. In particular if mortgages were sold to government sponsored entities and repurchased as agency guaranteed SB, regulatory capital requirements could be substantially reduced (Bolotny 2012). The presence and fast growth of these entities thus might have additionally influenced the behaviour of banks, especially with regard to securitization. The so-called GSE act pushed government sponsored entities to focus on 'underserved' groups. This is often considered to have contributed to the risky behaviour before the crisis. However, evidence in this regard is mixed. Some results are pointing at a causal decrease in loan quality triggered by this policy change (Xudong et al. 2007), while others do not find a significant impact (Bolotny 2012, Hernández-Murillo et al. 2012). Also, the portfolio purchases of government entities did not affect the primary or secondary mortgage market rates before the crisis (Lehnert et al. 2008). Though, the presence of these huge players in all likelihood affected the behaviour of market participants.

88. **There also were negative incentives engrained in the tax system**. Many tax systems encourage home ownership, encourage borrowing for residential homeownership, and encourage additional corporate leverage. Prior work by the OECD showed that greater tax relief on mortgage interest rates correlates with greater house price variability, which may encourage asset price bubbles (van den Noord 2003). Tax incentives for home ownership were increased in a number of countries leading up to the financial crisis. (Blundell-Wignall and Atkinson 2009, Hemmelgarn and Nicodéme 2010, Vandevyvere and Zenthöfer 2012). In addition, in many countries, extensive guarantee schemes for mortgages have further contributed to mortgage demand.

89. Further, most corporate income tax systems favour debt over equity, since equity returns are typically subject to tax at both at the corporate and shareholder level while most interest expense is deductible at the corporate level and interest income recipients are subject to individual income tax rules. While the advantage of corporate debt has been reduced by the decline in corporate tax rates and enactment of some corporate equity relief, the tax advantage of debt finance has contributed substantially to elevated leverage ratios, with potentially stronger effects for the geographic location of debt in subsidiaries of multinationals in high tax rate countries However, evidence suggests that the degree of bank finance in an economy is associated with weaker outcomes (Cournède and Denk 2014) and in particular cross-border lending played a crucial role in the transition of financial perturbations across countries (Allen et al. 2011).

5. CONCLUSION

5. 1. Analysing the crisis: A synopsis

90. On the credit supply side several factors framed the anatomy of the crisis. First, in particular as reaction to the crisis after the burst of the dot.com bubble the US Fed kept ***a low policy rate*** in a successful effort to keep demand high and to reduce unemployment. This, however, increased the taste for risk amongst investors via cheap wholesale finance. Arguably, this **induced** –mainly U.S. and European – **investors to take up more risk on the *liability side* of their balance sheets**. Credit was cheap and leverage ratios climbed to unprecedented levels.

91. Further since the late 90`s ***massive net capital inflows*** entered the US from emerging economies. On the one hand, this enabled the US to finance systematic current account deficits without experiencing a substantial devaluation of the exchange rate. Even more importantly with regard to the crisis, the net inflows of capital from emerging economies increased the demand for Treasuries thereby driving down their yields. This substantially **lowered *long term interest rates***. Therefore, **certain classes of investors were motivated to take up more risks on the *asset side* of their balance sheets** as well. Ultimately, this increased the demand for SB.

92. The **simultaneous increase in asset and liability risks is reflected in the *gross capital flows from Europe* to the US**. The leverage of European financial institutions rose, while at the same time, the exposure of investors to the market for asset backed securities continuously increased. This tethered Europe's fate dangerously to the U.S. mortgage market. Domestic demand – in particular for housing – was boosted. The paralleling net capital inflows into the US ensured that current account deficits, resulting from the boost in domestic demand, could be sustained.

93. At the same time, many households experienced a secular decline in relative income as income **inequality** increased. Curiously, this seems to have increased the demand for consumption and housing investment to compensate for losses in relative living standards. **Leverage ratios of households** increased **beyond sustainable levels as households were compensating the lack of income growth with credit**. In particular, mortgages increased thus satisfying the increased demand for SBs. Finally, many households ended up with unsustainable debt-to-income ratios and eventually defaulted on their loans.

94. On the institutional side, the substantial change in investors' preferences was driven by the **rise of institutional investors**. The effort to procure for ageing societies on capital markets as well as increased inequality in wealth shifted funds to investment and pension funds and fuelled the growth of money market funds. This development changed the structure of demand. Due to promises on the liability side of their balance sheets and to the management needs associated with large cash balances, the **demand for profitable and safe investment opportunities soared**.

95. **Flawed incentives of CEOs induced banks to** systematically underrate the importance of risk management, take up excessive risks and provide guarantees that exposed them to substantial tail risks. **Together with fundamental flaws in rating models, this enabled the production** of **allegedly safe financial assets out of risky mortgages**.

96. **The rise of new financial instruments** like repos and commercial paper based on financialised mortgages **allowed** otherwise constrained **institutional investors to directly and indirectly expose themselves to the mortgage market.** The separation between institutional funds and the housing market burst open.

97. Finally, regulators were not able to put an end to these developments. The **lack of understanding of the interdependencies of the system as a whole as well as regulatory capture** led to an insufficient regulatory reply to increasing fragilities in financial balance sheets. The lack of international coordination and flawed tax incentives were additional factors behind the build-up of fragilities.

5. 2. Policy lessons

98. Increasing interconnectedness of the financial sector and the world economy and the ever growing complexity of financial products and economic processes stood at the centre of the crisis. The sudden blow to the world economy has fundamentally eroded trust into the economic system and into the validity of our analytical tools. Against the backdrop of an ever more opaque economic environment, rebuilding trust will be the most important yet the most delicate task for policy makers, which will require a new analytical tool kit. This insight motivated the launch of the NAEC initiative and as a contribution to this initiative this paper tried to investigate key areas of policy intervention that are implied by the failures in the run-up to the crisis.

99. Earlier crisis resolution efforts – such as low policy rates – have in all likelihood contributed to the build-up of the current crisis. However, to prevent an excessive destruction of liquidity, monetary policy again had to become active at unprecedented levels. It is clear that structural reforms need to support monetary policy. Further, there is no experience with the long-run effects of unconventional monetary policy thus far. In order to prevent unorderly effects within and across jurisdictions, an **unprecedented level of coordination and cooperation**[33] seems to be required.

100. International capital flows have, in many cases, been clearly misguided into unproductive and excessive investments. Though, the region with the biggest involvement in the US subprime turmoil, turned out to have had a relatively balanced current account, in aggregate. The **urgent need for large scale surveillance and monitoring mechanisms** of international imbalances – including of gross financial flows – is one of the most important lessons from the crisis.

101. Inequality figured prominently in the run-up to the crisis. Financial crises can and do occur in equal societies as well, but it has become clear that diminishing inequality can help to reduce some of the major macroeconomic tensions that added to the current crisis. It will, therefore, be crucial **to move towards a policy regime that focuses on inclusive growth** thus allowing to unwind excessive stratification.

102. The rise of institutional investors together with their specific investment requirements fundamentally changed the structure of demand. This was to become the single most important pull-factor that triggered the production of complicated and ultimately risky financial products that were at the heart of the crisis. Given that institutional funds are set to rise in the foreseeable future, it is essential to **devote substantial research efforts to the question how these institutional funds can be effectively channelled into productive activities**.

103. Excessive risk-taking and flawed incentives figure prominently in the explanation of the crisis, but the clean-up has witnessed the rise of ever larger financial institutions and of bail-outs at an exceptional level. Policy makers face the hard task to restore proper incentives to avoid excessive risk taking in the future. **The owners' capital that is at stake in financial institutions needs to be increased**.

104. Excessive leverage of financial institutions played a decisive role. Even worse, the rise of the shadow banking industry enabled actors to bypass regulatory requirements. The fact that many of the

[33] Note the work on international regulatory cooperation done at the OECD (2013a) in this regard.

involved actors were too big to fail ultimately unloaded the downside risks to the tax payers. Efforts to **regulate the shadow banking sector, prevent excessive leverage taking and address the too big to fail problems** will play a key role in order to improve the stability of the financial system.

105. The unprecedented level of financial interconnectedness was a key ingredient in turning the crisis global. In particular, banks in Europe had even become too big to save for their home countries, which thus lead to an unhealthy entanglement of sovereign and financial risks. This shows that multinational financial conglomerates need multinational supervision and resolution mechanisms. **A new regulatory landscape that requires more cooperation and more information-exchange in order to avoid regulatory arbitrage thus is warranted**.

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