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The changing landscape of firm financing in Europe, the United States and Japan

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Abstract

We re-examine the structure of the financial sector, with a focus on firm financing, household assets and the structure of the banking sector of the 28 EU member countries, Japan and the United States. Our analysis is based on an extended panel dataset of 25 indicators over the period 1995-2016. This paper is an update and extension of a previous study by Bijlsma en Zwart (2013).

Using principal components analysis as in Bijlsma and Zwart (2013), we classify the EU-28 countries into different groups according to their financing patterns in 2015. We find four groups of EU countries, namely market-based countries, bank-based countries, Eastern European countries and outliers - countries with disproportionally large financial sectors in relation to their country size. Our classification is consistent with that of Bijlsma and Zwart (2013) for 2006, suggesting a strong persistence of financial structures in Europe over time.

We then discuss the development of a wide range of financial indicators before and after the 2007/8 global financial crisis. We observe a considerable decline in bank credit to non-financial firms, especially in bank-based and Eastern European countries. Furthermore, we see a shift in the capital market away from equity financing towards bond financing, especially in market-based EU countries and the US. The growth of alternative forms of financing is rapid. However, their size remains relatively small as a percentage of GDP. For the Netherlands, we observe a moderate increase in market financing and strong growth of alternative forms of financing such as factoring. Our research provides a useful comparative tool of the financial sector across Europe for policy makers.

1. Introduction

The past few decades have witnessed the increasing influence of the financial sector on the economy. Finance support investments, enlarge the productive capacity of the economy and constitute a key ingredient for long-term economic prosperity. But the global financial crisis of 2007/8 has vividly demonstrated that a larger financial sector is not necessarily better. Excessive lending growth drives up levels of private debt, causing major stability concerns with real repercussions for the economy in the aftermath of the crisis. Moreover, recent advances in Fintech and innovative financial instruments are likely to have profound impacts on the way financial services are provided, distributed and consumed. Understanding the shift of the role played by the financial sector has become more relevant than before.

Providing a comprehensive view of financial developments across countries is complicated by three facts: financial structures are complex, they differ significantly between countries and they change over time. Depending on the relative proportion of finance that is channeled through banks or markets, financial systems are often described as being bank-based or market-based. In bank-based financial systems, monetary-financial institutions remain the main vehicle of capital allocation and investment while, for the latter group, securities markets are equally important as banks for transferring the necessary funding towards firms. Continental Europe and Japan are traditionally considered as bank-based systems, in contrast to Anglo-Saxon market-based systems. Although the distinction between bank- and market-based systems has become less clear recently as banks have become increasingly more market oriented, nevertheless, the paradigm of bank- vs. market-based systems provides us with a useful tool for comparing financial systems across countries.

Although existing studies acknowledge the distinctive features of bank- vs. market-based systems, there is no robust evidence as to which system is better for growth in a cross-country framework. For example, Demirgüç-Kunt and Levine (2011) conclude that *“no evidence exists that distinguishing countries by financial structure helps explain differences in economic performance. More precisely, countries do not grow faster, financially dependent industries do not expand at higher rates, new firms are not created more easily, firms access to external finance is not easier, and firms do not grow faster in either market-based or bank-based financial systems.”* Neither system is unequivocally better for growth, which crucially depends on the efficiency of financial and legal institutions (Chakraborty and Ray, 2006). Gambacorta et al. (2014) further postulate an optimal size of the financial system. Up to a point, banks and markets both foster

growth. Beyond that limit, “too much (bank- or market-) finance” no longer contributes to growth. They also find that banks and markets differ considerably in their effects of moderating business cycle fluctuations. Banks are more likely to supply loans during a normal downturn, thereby absorbing the shock and smoothing the impact of recession. However, when the downturn is associated with a financial crisis, bank-based systems suffer on average three times more than market-based systems. This finding is also in line with Allard and Blavy (2011), who show that financial structure matters for a country’s ability to recover from financial crises: market-based economies recover significantly faster than bank-based economies.

Against this background, the objective of this paper is to provide a comprehensive assessment of the development of financial systems in the 28 EU member countries, Japan and the United States during the period 1995-2016. We do so in two steps. First, following Bijlsma and Zwart (2013), we classify the European countries into groups with similar financial sector characteristics by means of a principle component analysis (PCA). While Bijlsma and Zwart’s (2013) classification is based on the data for 2006, our classification makes use of more recent data for 2015. Our analysis allows us to uncover the changes of financial landscape in Europe over the past decade. Second, we compare the developments of an expanded set of 25 indicators between different financial systems over the period 1995-2016. A longer time span gives us a better understanding of the changes over the past decade.

Our contribution is twofold: First, we update the empirical analysis of Bijlsma and Zwart (2013) up to 2016 and thus to incorporate the past decade of financial turmoil. Our main question of interest is to what extent financial systems have changed 10 years after the crisis.

Second, we focus on various channels of firm financing, as they are the key to long-run growth and development. Our analysis covers a wide range of indicators. We first look at traditional bank financing through credit extended to the private sector. Then, we examine market-based financing through equity financing, corporate bonds and securitization. In addition, we include a set of new indicators on alternative forms of financing such as factoring, crowd funding and angel investments in light of the rapid development of alternative finance during the last few years. These new forms of financing are gaining momentum as firms are increasingly searching for new opportunities for funding. Since the banking sector plays a crucial role in financial intermediation, we also examine the funding of banks through household portfolios as well as the structure of the banking sector, such as

size, ownership, competition and performance. To the best of our knowledge, no comparable study examines the channels of firm financing as extensively as we do.

We provide two sets of results: First, the principle classification from PCA remains largely unchanged compared to the original classification reported in Bijlsma and Zwart (2013). We observe four groups of countries in the European Union. Bank-based countries like Germany have a large bank sector while market-based countries like the United Kingdom have, in addition, more developed equity markets. Two other groups are distinguished. One group consists of Eastern European countries that joined the EU more recently. These countries are found to have smaller financial markets compared to old member states. The other group is composed of the outliers, which refer to countries that could not be classified in the other three categories. These countries have a disproportionately large banking sector relative to their size and are often considered as tax havens.

Compared to a traditional bank-based country such as Japan, market-based countries in Europe have a much larger banking sector as measured by the size of total banking assets relative to GDP. At the same time, the US banking sector is significantly smaller as market-based funding through the stock market and schemes like venture capital are more prevalent. Furthermore, the level of stock market capitalisation is roughly the same for market-based European countries and Japan. These findings suggest that financial systems are considerably different across countries and most importantly, persistent over time. The transition from one system to another therefore does not happen overnight but builds up over many years.

Second, when we compare the developments of various indicators across different financial systems, several important findings are worth noting. We observe a significant drop in bank credit to non-financial firms in bank-based EU and Eastern European countries. The lack of bank credit imposes severe constraints on the post-crisis economic recovery. Furthermore, we see a shift in the capital market away from equity financing towards bond financing especially in market-based EU countries and the US. Equity markets have been shrinking globally since the millennium, reflected by the decline in new share issuance and venture capital financing. Owing to low interest rates, corporate bonds have become an attractive source of financing. For instance, corporate bond issuance as a share of GDP in the market-based EU countries has grown on average from 10 to 15 percent over the past decade. Lastly, we see considerable growth of alternative forms of financing. However, their sizes remain relatively small as a percentage of GDP.

We are particularly interested in financial developments of the Netherlands. We notice some shift from bank to market and new forms of finance. While bank credit to non-financial firms has stagnated during the past two decades, corporate bonds and venture capital markets have shown slight increases. Stock market capitalisation has returned to the pre-crisis level. Factoring, as an alternative form of finance, experiences a rapid increase, which may have helped to ease the financing difficulties of Dutch SMEs to some degree.

The remainder of this paper proceeds as follows. In section 2 below, we discuss the technique to classify financial systems into groups and present the results. In section 3, we thoroughly examine the developments of various channels of financing between different financial systems, including both traditional bank and market financing, but also alternative forms of financing, household finances and the structure of the banking sector. In addition, we discuss the developments of the financing channels for the Netherlands and the country groups. Section 6 concludes.

2. Financial systems in the EU

For the purpose of our analysis, we build an extensive database of 25 financial sector indicators for 30 countries – the EU28, United States and Japan over 1995 to 2016. We collect data from various sources such as the OECD, the World Bank and Central Banks. A detailed description of the indicators and their sources is presented in Appendix A.

To classify European countries with similar characteristics of financing, we perform a principal component analysis (PCA) to uncover uncorrelated components among a set of eight representative indicators in 2015.¹ We then use a clustering algorithm to identify groups on basis of the first two components of PCA that captured 71% of cross-country variance. In short, this classification provides a useful benchmark to compare the financial systems between (groups of) countries and their developments over time. More details over the method we use are presented in Appendix B. Using this method, we identify four groups of European countries in Figure 2.1 (right panel):

1. (*Market-based countries*) Belgium, Denmark, Finland, France, the Netherlands, Sweden and the United Kingdom
2. (*Bank-based countries*) Austria, Germany, Greece, Ireland, Italy, Portugal and Spain
3. (*Eastern European countries*) Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia
4. (*Outliers*) Cyprus, Luxembourg and Malta

We consider the first group to be the market-based countries. Among all the European country groups, this is the one closest resembling the financial system of the United States. Interestingly, we notice that this group is lying closer to Japan than the United States. This is not surprising given that a large bank sector is also present in this group of countries. We discuss this point in the next sections. The second group is the bank-based EU countries. They rely less on market financing relative to the first group. The third group is the Eastern European countries, all of which became the Member States of the European Union either in the 2004 enlargement or at a later stage. The last group consists of countries that are considered as outliers; they have a disproportionately large banking sector compared to their national economies.

¹ Since the data for some variables are not available in 2016, we use the 2015 data for this analysis.

Figure 2.1: Groups of EU countries based on PCA analysis

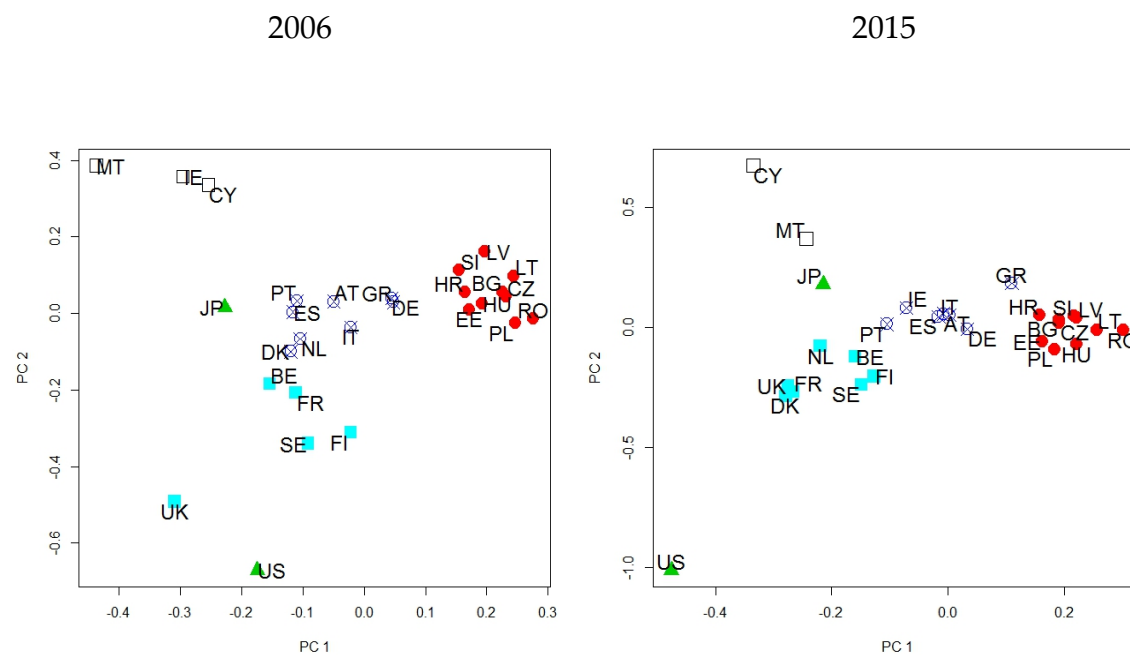


Figure 2.2 further shows the 2015 classification on the map of Europe. The groups are clearly geographically clustered. The market-based countries are predominately located in the North West region, whereas the bank-based economies are mostly located in the South and Central Europe. The borders of the Eastern European countries in our analysis coincide with the geographical borders. In all, we find a strong geographical dimension in the grouping without making prior assumptions on which country belongs to which group. Instead, we create groups relying exclusively on the data.

Figure 2.2: Classification of EU countries into groups based on principal component analysis.



The 2007/8 global financial crisis has had a profound impact on the global financial systems. An interesting question that arises is whether the crisis has had any impact on the classification of country groups. To answer this question, we perform a similar analysis for 2006 and compare the results with those of 2015 in Figure 2.1. We find that the classifications before and after the crisis remain rather stable, implying a strong persistence of financial structures over time.

Three points of changes are noteworthy. First, Ireland was before the outburst of the financial crisis part of the outliers group instead of the bank-based group after the crisis. Two developments may have led to this change. On the one hand, bank credit to non-financial firms decreases sharply after 2009 and this decrease is continuing until 2016. On the other hand, both total assets and foreign assets of banks in Ireland are significantly lower in 2015 than in 2006 as a consequence of the reforms in the Irish banking sector. Thus, the Irish financial sector resembles other bank based countries more than the outliers in 2015.

Second, while Denmark and the Netherlands were part of the bank-based countries in 2006, they are placed as the market-based countries in 2015. Note that the Netherlands was considered as a market-based country in 2006 in Bijlsma and Zwart (2013). We attribute this difference to the subsequent revision of the 2006 data that

altered the original position the Netherlands relative to other countries. Lastly, the differences between the United States and the market-based EU countries grew bigger. This development is owing to the sharper increase in venture capital for the United States in comparison to the rest of the countries.

3. The development of firm financing

In this section we present in detail the development of various channels of firm financing among different groups of countries over time as well as the performance of each individual country during the period 1995-2016. We use the country classification of 2015 to present our results. We focus on bank-intermediated credit in section 3.1, market-based financing and alternative forms of financing in section 3.2. We further examine the substitution between bank financing and market financing in section 3.3. To better illustrate the developments of the Dutch financial sector, we present the results separately for the Netherlands and the rest of the market-based countries.

3.1. Bank-intermediated credit

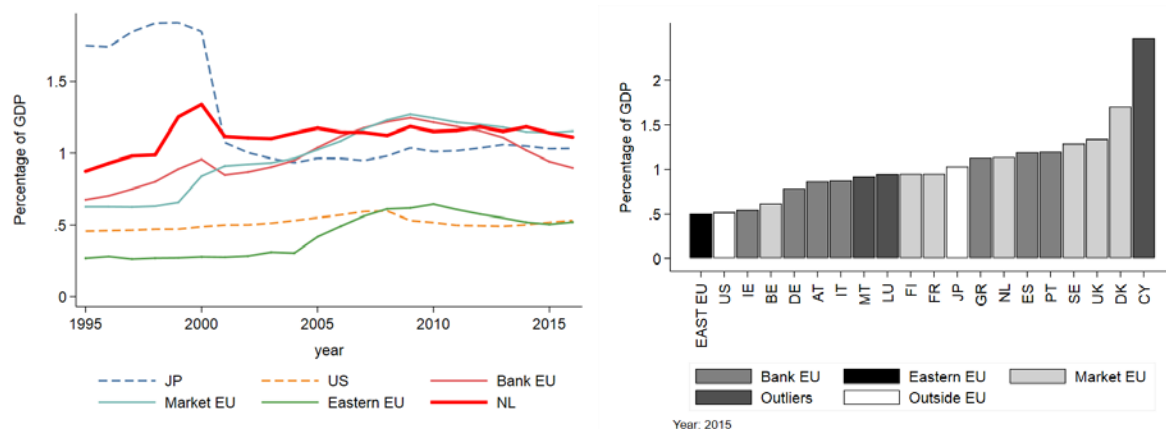
To evaluate the importance of bank-intermediated finance, we first look at the size of bank credit to the private sector (or private credit) as a percentage of GDP in Figure 3.1.

On average, the bank-based, market-based European countries and Japan have larger amount of bank credit than the United States and the Eastern European countries. Notably almost all EU countries, especially the Eastern European ones have experienced a substantial increase in private credit until the outbreak of the crisis and a considerable decline since 2010. The decline is much sharper for the bank-based EU countries, which reaches the same levels as the market-based countries in 2015. Private credit in Japan and the United States remain relatively stable over time, which appears less affected by the crisis. While private credit recovers to the pre-crisis level in most countries, it is not the case for the bank-based countries, and to a lesser extent the United States.

The right panel of Figure 3.1 shows the level of private credit as a share of GDP for all countries in 2015.² The order of countries is mixed and we don't observe a clear pattern. From the top eight countries with larger bank credit to the private sector, four are market-based, and three are bank-based. This is in line with the previous finding of Bijlsma and Zwart (2013) that the market-based EU countries also have a larger bank sector, reflected by a large amount credit extended to the private sector.

² The ordered plots presented on the right panel of the subsequent figures refer to data from the year 2015 unless stated otherwise.

Figure 3.1: Bank credit to the private sector³



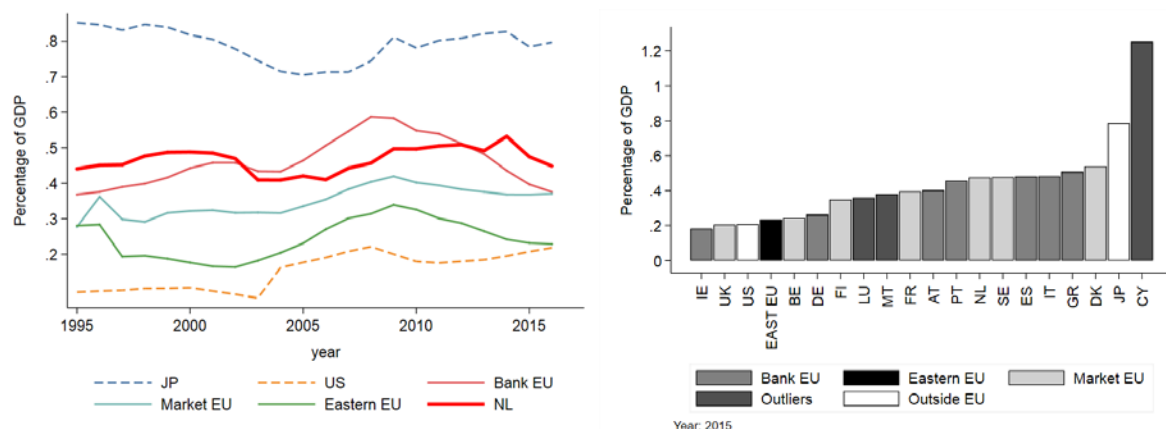
Since bank credit to the private sector includes both credit to households and firms, we are particularly interested in bank credit to firms, which is a better measure of the role of banks in channeling funds to non-financial firms for productive use. As in the left panel of Figure 3.2, we see that Japan has the highest level of bank credit to firms, followed by the bank-based EU countries, the Netherlands and other market-based EU countries.

The development of bank credit to firms among the groups is quite distinctive. While all EU countries have experienced a decline in bank lending to firms since 2009, the decline is much steeper in the bank-based and Eastern European countries in contrast to the market-based countries. As a result, the differences in the level of bank-credit between the bank-based and market-based countries become narrower since the crisis. The Netherlands lies closer to the bank-based group than the market-based – where it was classified in our analysis. Bank lending in the Netherlands also follows the decline of the bank-based group during the latest years. While credit to firms remains relatively stable in the Netherlands during the economic crisis, it declines from 2015 onwards. Furthermore, Japan and the US demonstrate more stability in their bank lending to firms. We can even observe a slight increase for the US after 2011.

The right hand side of figure 3.2 shows that there is no clear distinction among groups. As expected, Japan has a high level of bank credit to non-financial firms and the US low. However, the European countries appear to be mixed and we cannot observe a definite trend.

³ The jump in the Japanese data is due to a change of reporting. The peak in the Dutch data in 2000 is due to a break in the series as well.

Figure 3.2: Bank credit to non-financial firms⁴



3.2. Market-based financing

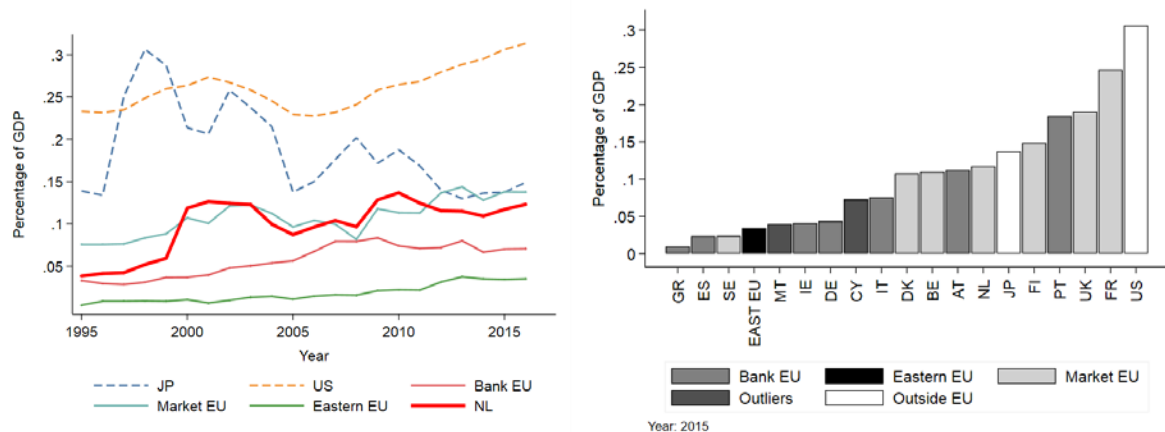
3.2.1 Corporate bond

Bank credit is not the only way of firm financing. Market mechanisms can be equally effective. Hence we look at market mechanisms for firm financing in addition to the bank-intermediated credits to firms. Figure 3.3 illustrates the corporate bond market. The United States, as a typical market-based economy, has the largest bond market as a fraction of GDP followed by Japan and the European countries. Japan and market-based EU have shown more fluctuations than the bank-based and Eastern European countries. Market-based EU countries have increased their share, which stand at the same levels as Japan, while the bank-based EU countries have experienced a moderate decrease after 2009. The Netherlands develops in accordance with the market-based EU countries.

Looking at the right panel of Figure 3.3, we see that the market-based EU countries have on average a bigger market for corporate bonds relative to their GDP than the bank-based EU and Eastern European countries. This pattern was not so clear in Bijlsma and Zwart (2013), where the country levels were mixed between groups due to the financial market turmoil. Note that the market for corporate bonds in Luxembourg (not shown in the figure) is almost double the size of the US market.

⁴ The peak in the Dutch data after 2014 is due to a structural break in the ECB data.

Figure 3.3: Size of the market for corporate bonds⁵



3.2.2 Securitized loans

In addition to the market for corporate bonds, we look at securitization as it is an important market mechanism for the financing of financial institutions in Figure 3.4. Securitization allows debt issuers to resell this debt in the form of securities. It involves the bundling of illiquid debts (e.g., mortgages, car loans, etc.) and through financial restructuring, transforming these illiquid debts into marketable securities, thus liquid assets. In Europe as a whole, mortgages constitute on average 65% of the securitized loans over time. And more than 50% of the securitized loans are retained by the banks and used as collateral to obtain liquidity from the central banks since the crisis. The percentage reached on average 80% during 2008-2011.⁶

In the US, the volume starts to decline significantly in 2008 followed by the European countries in 2011. The European countries surpass the US in 2009 and start declining in the following year. Japan revolves around a lower level than the rest of the countries. Securitized loans in Japan also decline since 2011 – which is the first year that data are available –, but more gradually in comparison to the other groups. The decline in securitization for all country groups reflects the concerns among investors about the risks involved, since securitized products – mortgages turned into mortgage-backed securities – were a major contributing factor in the subprime mortgage crisis of 2007. The Netherlands has a significantly larger volume of securitization than the rest of the EU, the United States and Japan. Dutch banks

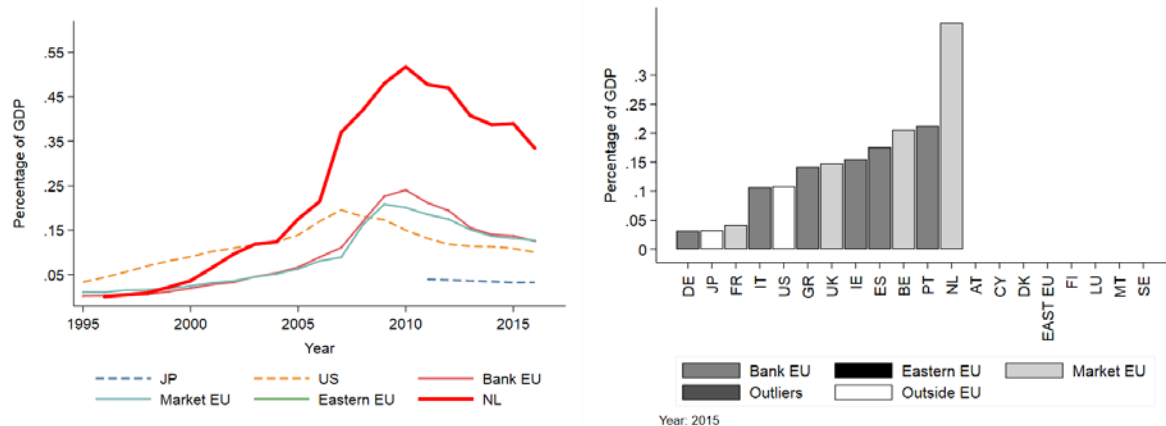
⁵ Since values for Luxembourg were significantly higher than for the rest of the countries, we decided to exclude Luxembourg from the 2015 country comparison graph. This choice was made for reasons of graph comprehension and easier reading of the values. However, values for Luxembourg can be found in the dataset available online.

⁶ While we don't have data on the retention rate before 2017, the evidence based on the Netherlands suggests that very little securitized loans are retained before the crisis, see for example Zhang (2016).

increased their securitization substantially till the outbreak of the crisis and contracted them considerably afterwards. We observe a decline in the outstanding amounts of securitized loans since 2011 in other countries, a trend that persists until today. The European Commission makes decisive steps, as part of the Capital Markets Union action plan, to re-establish a safe securitization market in the European Union since this can lead to more credit for businesses and households. This is a very important initiative for the European countries where the economy is 75-80% bank financed (OECD, 2012).

Looking at the right panel of Figure 3.4, we identify no clear pattern among country groups. Germany, a bank-based country, has the lowest levels of securitized loans followed by Japan and France (market-based). The Netherlands has the highest level of securitization followed by a bank-based (Portugal) and a market-based country (Belgium). The United States remains at a lower level than most EU countries.

Figure 3.4: Outstanding securitized loans⁷



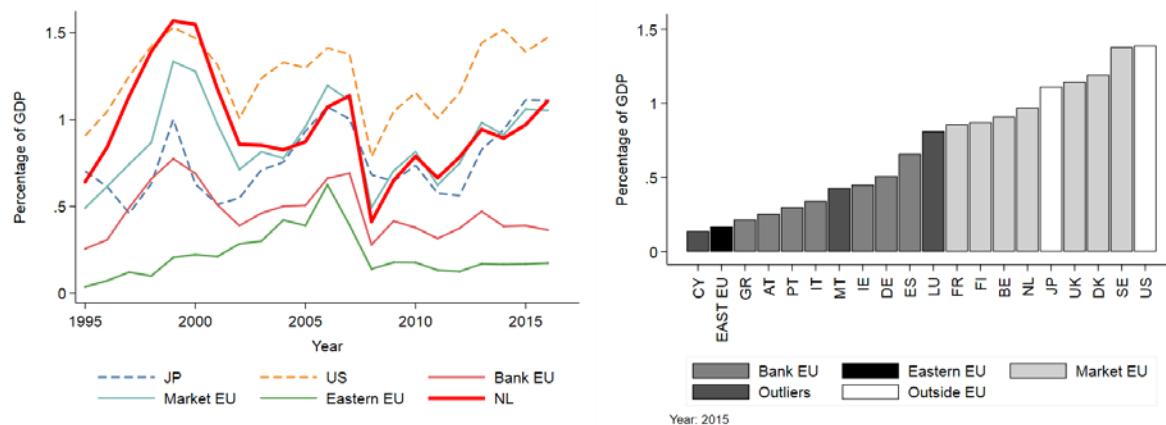
3.2.3 Equity funding

Another important aspect of market-based funding is equity funding. We first look the stock market capitalisation of listed firms to capture the importance of capital markets in Figure 3.5. The United States has the highest level of stock market capitalisation followed by the market-based EU countries and Japan. We observe a substantial decrease in the year 2008 for all groups. While the Eastern and bank-based Europe remain relatively stable after the 2008 turmoil, the market-based EU countries and Japan experience an increase. At 2016 the US stock market has exceeded the pre-crisis level of 2006 while Japan and market-based EU countries

⁷ Empty bars in the right panel are due to the lack of data.

have nearly reached their pre-crisis levels. The bank-based EU and eastern European countries are still lagging far behind their pre-crisis levels, stabilizing at a lower level than before the crisis. The right panel of Figure 3.5 shows that the bank-based EU countries rank lower than the market-based ones.

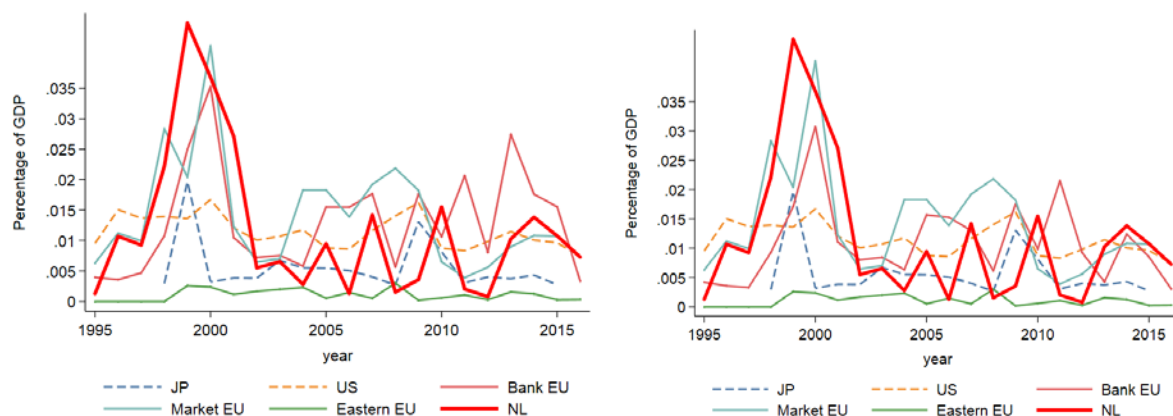
Figure 3.5: Stock market capitalisation



Certainly, stock market capitalisation contains useful but limited information. It captures the market value of all listed firms, which is likely to be driven by stock prices. To what extent firms obtain equity funding from the stock market are therefore, unclear according to this indicator. Another way to measure stock market activity is the issuance of shares by listed companies in Figure 3.6. Looking at the left panel, what first stands out is the high level of issuance in the period 2013 to 2015 for the bank-based countries. The steep increase for the bank-based EU countries is driven by Greece and its banks' bailout and recapitalisation during the period 2013-2015. These new shares were bought both by private investors and the state through the Hellenic Financial Stability Facility in exchange for non-voting shares. In 2016, when the recapitalisation does not take place anymore, listed shares issuance is decreased to a lower level than 2007. To avoid letting the Greek bailout program skew the results for the bank EU group, we reconstruct the figure excluding listed shares issued in Greece in the right panel.

We observe that until 2010, the trends are mixed. Afterwards, we see that the US has the largest issuance on average followed by the market-based EU countries. Since 2014, the United States, the market-based EU countries and the Netherlands follow the same trend and face a decline. Japan and Eastern European countries show the lowest levels of issuance among the groups. The bank-based EU countries face a steeper decrease since 2014 compared to the US and market-based EU.

Figure 3.6: Issuance of listed shares⁸

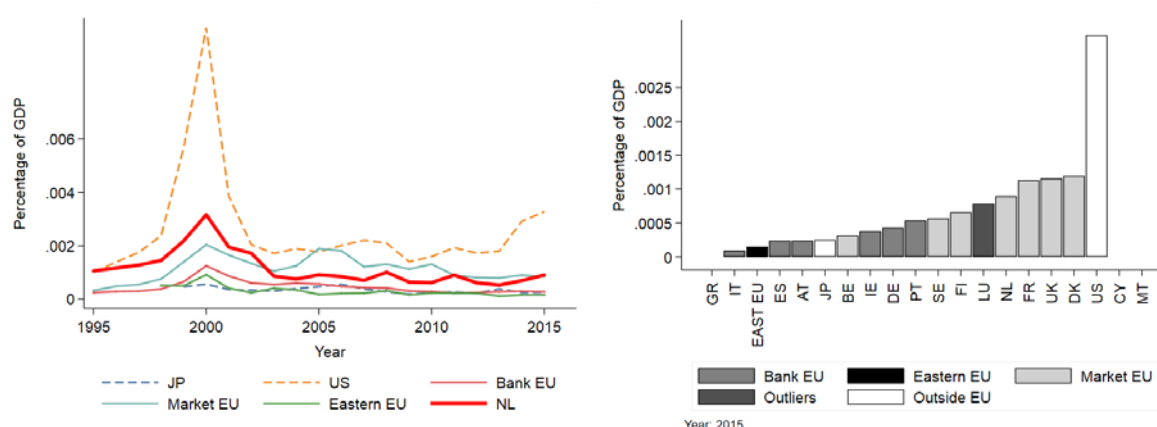


While market mechanisms, such as corporate bonds and stock markets are essential for firms' funding, especially large corporations take advantage of them. Smaller and medium sized firms may seek other access to funding, such as venture capital. Figure 3.7 shows the size of investments by venture capital firms for all stages – namely seed, start-up and later stage venture- but exclude private equity investment in buy-outs and restructuring.

Venture capital investments peak in 2000 before the dot.com crisis and to some extent before the 2007/8 financial crisis. The US has seen a considerable increase in VC investments since 2013, which has exceeded the pre-crisis peak in 2008, but remains far behind the level prior to the dot.com crisis. The US has a significant larger ratio of VC investments as a share of GDP compared to other countries. The levels of the Eastern European countries, Japan and bank-based EU are relatively low. Overall the magnitude of venture capital investments as a percentage of GDP is quite small, suggesting that it still plays a limited role in firm financing. However, it is worth noting that venture capital is the main form of financing for high-risk firms that otherwise could not receive financing through a bank. Thus, the role of venture capital funding –even though limited – is still important for innovative firms.

⁸ Since we observe a rather volatile issuance, we do not include the levels of individual countries for 2015, however details on the country levels can be found in the dataset.

Figure 3.7: Investments by venture capital firms



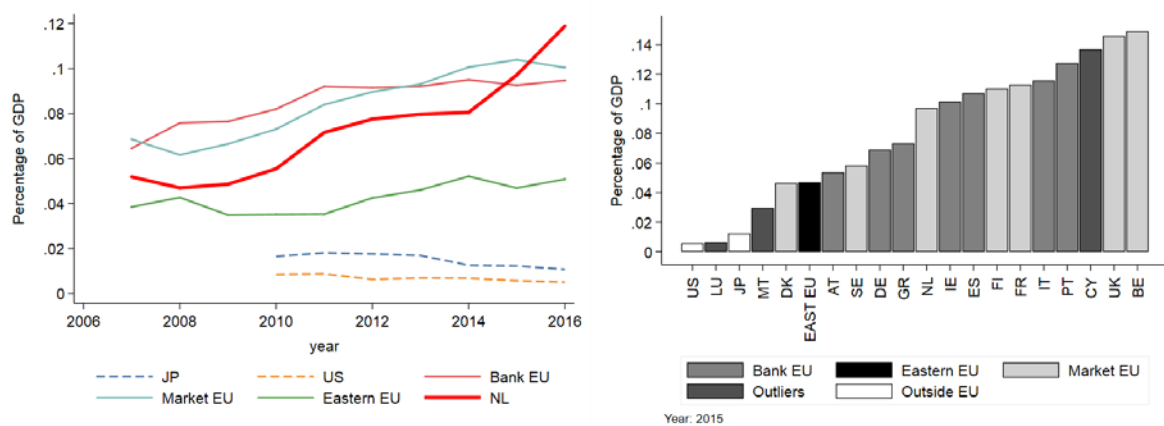
3.2.4 Alternative financing

Since we are also interested in the financing of small and medium size enterprises, we investigate further other available funding opportunities. Consequently, we add three additional indicators to examine alternative forms of finance, namely factoring, crowd funding and angel investments. These financing channels are mainly used by SME's and have seen a rapid growth of use during the last years.

Finance through factoring occurs when a company (called a factor) buys a debt or invoice from another firm at a discount. The goal of the seller is to meet his immediate cash needs. Factoring finance, as shown in Figure 3.8, occurs at a higher rate in European countries than in the US and Japan. We find an increase in the factoring volumes for all three European groups, while the US and Japan show a small but steady decrease. The market-based EU countries have slightly higher factoring volumes after 2012 than the bank-based ones but when looking at the country comparison we see that in fact that the rank is mixed. While the top two countries in volumes are Belgium and the United Kingdom, the next three countries are Cyprus, Portugal and Italy – the last two being part of the bank-based group. Since 2014, the Netherlands has the steepest increase in factoring volumes among the European countries. Even though the factoring volumes are still low, the increase in the bank-based and market-based countries are remarkable, as both groups face an increase of more than 50% between the years 2007 and 2016. Factoring is used as an alternative form of finance mainly by small and new firms. The extensive use of factoring in developing countries, with less developed institutions, indicates a

possible substitution of bank credit. Thus, a volume increase of factoring could also be an indication of access difficulties to bank finance; however, we cannot yet draw a clear connection of substitution between the two forms of financing.

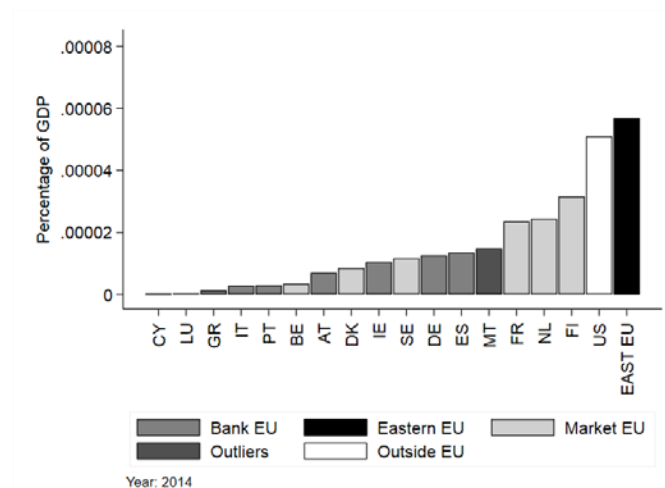
Figure 3.8: Factoring volume



We, then, look at two forms of financing mainly used by start-ups, namely crowd funding and angel investments in Figure 3.9 and Figure 3.10, respectively. While angel investors are individuals who invest their personal capital, crowd funding relies on the smaller contributions of a large number of online investors. Since our data for crowd funding and angel investments are limited to a couple of years, we primarily focus on the country comparison. The Eastern European countries score high in both indicators.

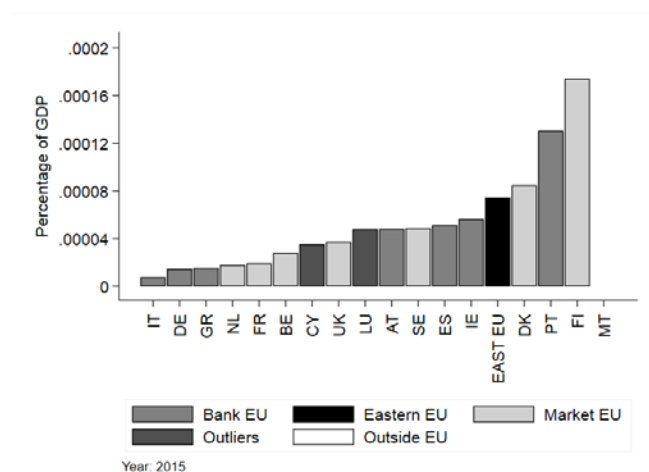
As shown in Figure 3.9, crowd funding volume is higher in the market-based than the bank-based EU countries. We exclude the United Kingdom from the figure. The size of crowd funding in the UK is 0.0006 percent of GDP, which is around ten times higher than the crowdfunding volumes of the rest of the countries. Albeit quite small relative to other traditional financing instruments, it is significantly larger in comparison to other countries. For example, the Eastern European countries have one tenth of the value of the UK, followed by the US. The Netherlands scores high in terms of crowd funding use, in comparison to the rest of the European countries, possibly due to a high number of available crowd funding platforms.

Figure 3.9: Crowd funding volume.⁹



While we observe a distinction of crowd funding use among different groups of countries, this is not the case for angel investments. Similarly we exclude the US from the figure as its size is ten times higher than that of the second country, Finland. Nevertheless, in Figure 3.10 we do see again that the Eastern countries have high volumes of angel investments relative to their GDP. While Finland, a market-based EU country scores the second highest in angel investments, it is followed by Portugal – a bank-based country. Many market-based countries, such as the Netherlands, have very low volumes of angel investments. Both crowd funding and angel investments still remain niche markets. The volumes of financing through these new forms are significantly lower than e.g. bank financing.

Figure 3.10: Angel investment volume¹⁰



⁹ Data refer to year 2014. Since values for the United Kingdom were significantly higher than for the rest of the countries, we decided to exclude it from the 2015 country comparison graph. This choice was made for reasons of graph comprehension and easier reading of the values. However, values for the United Kingdom are available upon request.

¹⁰ The US was excluded from the figure for an easier graph comprehension.

Albeit limited in size, crowd funding and angel investments appeared to experience tremendous increases during the last years. Based on the data we have on 2013 and 2014, we find that crowd funding has increased by 159% in the bank-based economies, 77% in the market-based countries and 747% in the Eastern European countries.¹¹ During the period 2013-2015, angel investments have grown in total by 76% in the bank-based economies, 21% in the market-based countries and 82% in the Eastern European countries.

3.2.5 Merger and acquisitions

We next look at the cross-border mergers and acquisitions, which indicate how open countries are to foreign investors. Openness to foreign investments incentivizes firms' managers to put in effort to achieve a higher performance otherwise their firms could merge with more successful rivals. Thus, the market for takeovers reflects the extent of market monitoring, which could be an alternative to bank monitoring.

Due to large volatility over time, we do not uncover persistent trends. In Figure 3.11, we observe a large increase in 2000 and again right before the financial crisis for the Netherlands due to a large bank acquisition in 2007 (UNCTAD, 2008)¹². Due to that fact, we decide to take a second look at the trends for other countries excluding the Netherlands. In Figure 3.12, we see that the market-based EU countries are the most open ones for acquisitions in most of the years. Japan's level of openness remains low over time. Since 2007, M&A flows remain relatively low in Eastern European countries. In the right panel of Figure 3.12, we observe a clear distinction between the market-based and bank-based EU countries. All market-based countries experience a large degree of openness followed by the US. The bank-based EU and Eastern countries follow up with Japan being at the lowest rank. Luxembourg and Ireland have a very large share in cross-border mergers and acquisitions and thus they are excluded from the graph. The amount of cross-border M&A is almost ten times bigger than that of the countries with the highest values for 2015, namely 0.23 for the former and 0.17 for the latter.

¹¹ The high value is driven by Hungary, which experienced a thirtyfold increase in crowd funding between 2013 to 2014.

¹² ABN- AMRO Holding N.V. acquisition by RFS Holdings B.V. was the biggest cross-border M&A deal in that year with a value of 98.2 billion dollars.

Figure 3.11: Cross-border M&A (by country of seller)

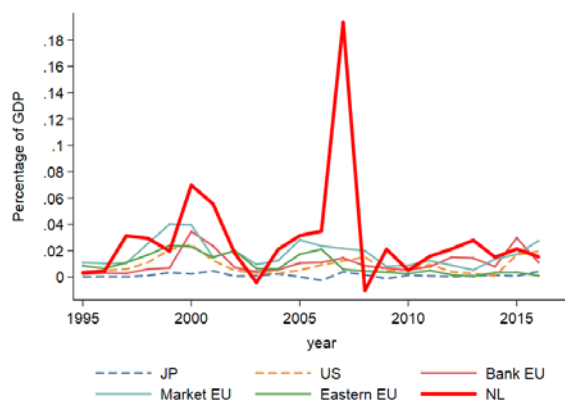
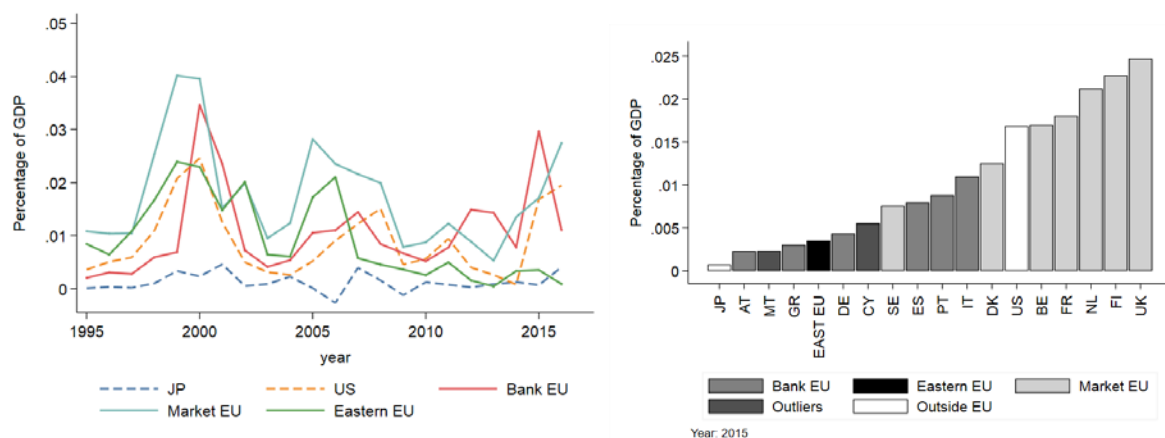


Figure 3.12: Cross-border M&A (by country of seller)¹³



3.3. Substitution of bank credit by market funding during the crisis

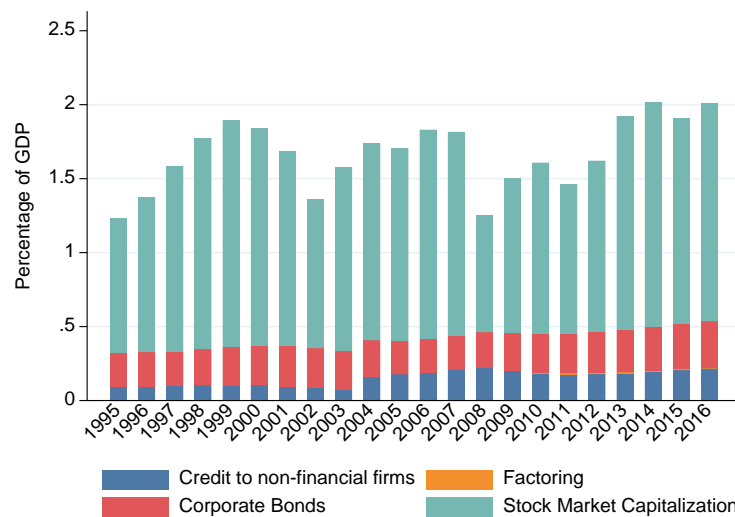
In addition to the development of each indicator, we are interested in examining to what extent there has been a substitution among financing channels. To do so, we compare the development of key financing indicators for each country group, namely bank credit to non-financial firms, market financing through stock market, and corporate bonds, and an alternative form of financing, i.e., factoring.

Firms in the United States rely the least on the banking sector to finance their activities, as we can see in Figure 3.13. Market financing – indicated by stock market

¹³ Since values for Luxembourg and Ireland were significantly higher than for the rest of the countries, we decided to exclude the two countries from the 2015 country comparison graph. This choice was made for reasons of graph comprehension and easier reading of the values. However, values for Luxembourg can be found in the dataset available online.

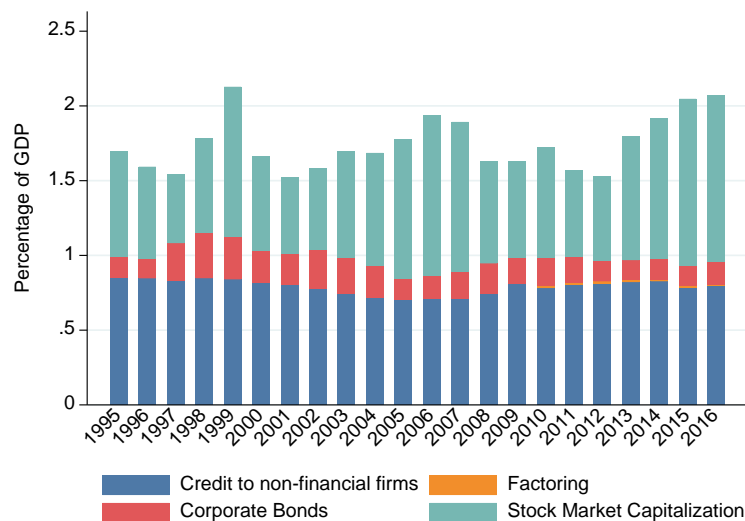
capitalisation – experiences a big decrease after 2007 but has now recovered to its pre-crisis level. US firms make a greater use of corporate bonds to finance their activities during the recent years. Factoring is barely used.

Figure 3.13: Comparison of financing channels in the United States



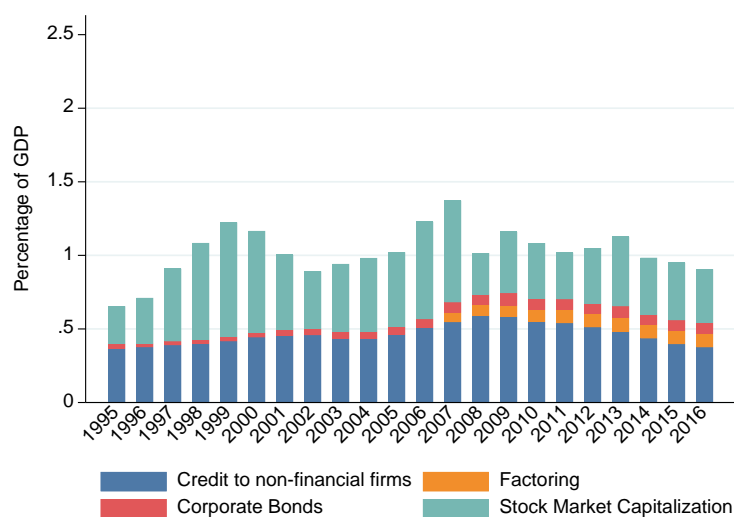
Japan on the other hand has a developed banking sector. Therefore, bank financing plays an important role for the Japanese firms in Figure 3.14. While the size of the stock market reduced during the crisis, it has exceeded the pre-crisis level by 2016. Corporates bonds are in use to a lesser extent than before the crisis. Last, financing through factoring remains low.

Figure 3.14: Comparison of financing channels in the Japan



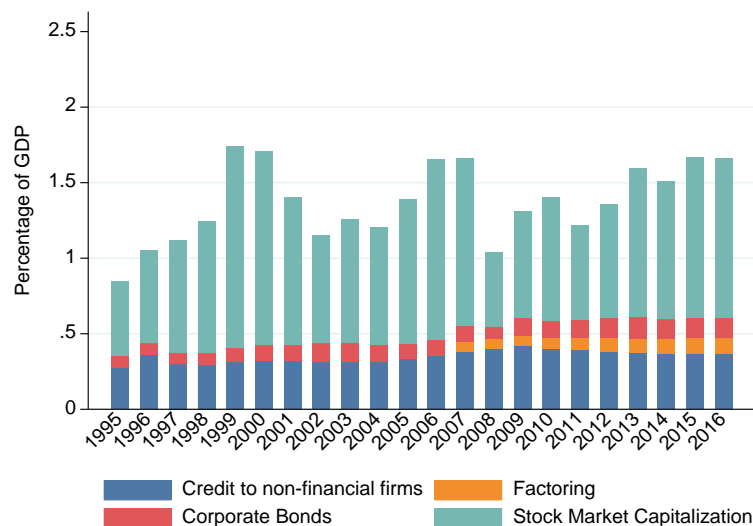
As shown in Figure 3.15, the bank-based EU countries experience a drop in bank financing after 2010. The size of the stock market is slowly increasing. Corporate bonds account for a lower amount of financing than factoring.

Figure 3.15: Comparison of financing channels in the bank-based EU countries



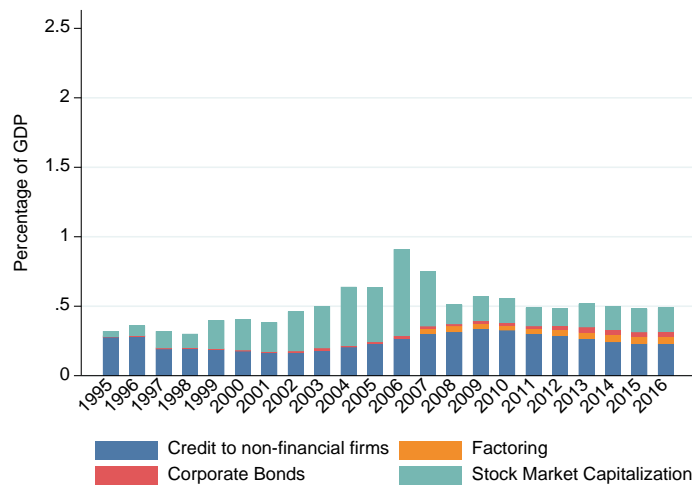
The market-based EU countries rely more on market financing than the bank-based EU countries in Figure 3.16. Stock market capitalisation is in 2016 close to the pre-crisis level. Corporate bonds and factoring have increased during the recent years.

Figure 3.16: Comparison of financing channels in the market-based EU countries



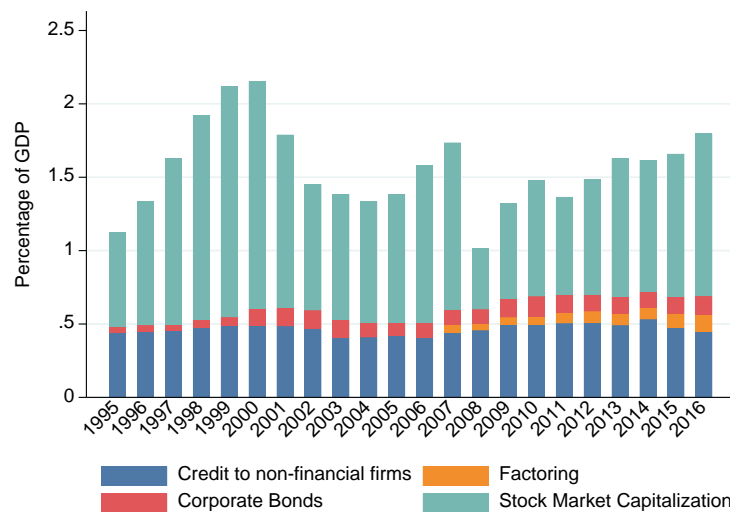
As seen in Figure 3.17, bank credit is lower in the Eastern European countries than the rest of the EU groups. However, it still remains the main financing source of firms as all channels are less developed. Bank credit steadily reduces since 2009. Stock market capitalisation has not recovered to the pre-crisis levels and we do not see an increase in other financing channels that could replace it. Finance through corporate bonds has increased. As a result, financing of firms in the Eastern countries remains lower than the pre-crisis level.

Figure 3.17: Comparison of financing channels in the Eastern EU countries



In Figure 3.18, we observe the development of firm financing in the Netherlands. Bank credit plays an important role. We observe a decrease in bank credit to firms after 2000, which coincides with the increase in bank credit to household mortgages during the same time. Although it somewhat increases after the crisis, this is partially due to the contraction in GDP. The size of stock market capitalisation has contracted sharply after the crisis, but has gradually recovered to the pre-crisis level. Nevertheless the activities in the stock market remain significantly lower than the level of 2000. The use in corporate bonds remains relatively stable, with a slight increase in the recent years. The increase in factoring volume is also apparent. It is worth noting that factoring is an alternative form of financing mainly used by small and new firms. Thus, the increase in factoring volumes might indicate a striving of SMEs for bank financing.

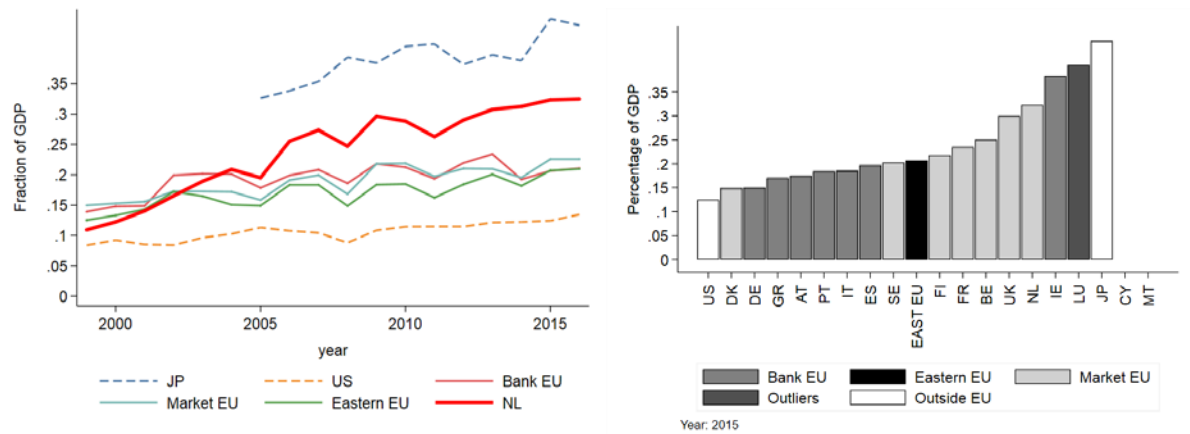
Figure 3.18: Comparison of financing channels in the Netherlands



Overall, we observe differences in the level of total financing among country groups. The United States have the highest financing level as a percentage of GDP, followed by Japan and the market-based EU. The Eastern European countries experience lower volumes of financing than the rest of the country groups. When comparing the latest available year with the outburst of the crisis, we observe that the US, Japan and market-based EU improve their financing levels while bank-based EU and Eastern EU face a continuous decrease and have not recovered.

As we observe a decline in bank credit for some of the groups in the recent years, we are curious to know if this is driven by demand or supply. Thus, we look at the deposits of non-financial corporations. In Figure 3.19, we observe a mild increase for most of the groups over time. Japan has the highest level of deposits followed by the Netherlands and the market-based countries. The US firms' deposits are the lowest amongst all groups. In the right panel of Figure 3.19, we see a clear trend among country groups. All bank-based EU countries experience lower level of corporate deposits. Even though we do observe a trend of stable or in some cases increasing deposits over time, it is hard to interpret this finding. On the one hand, the stable level of deposits could be an indication of a higher turnover and the use of the additional funds for financing new activities. As a result, it would indicate no need for additional financing from the banks. However, on the other hand, it could indicate stagnation in profits and, as a result, the need of external funding. Thus, we are cautious to interpret this indicator as a proof of a demand driven decrease in bank credit.

Figure 3.19: Deposits of non-financial corporations



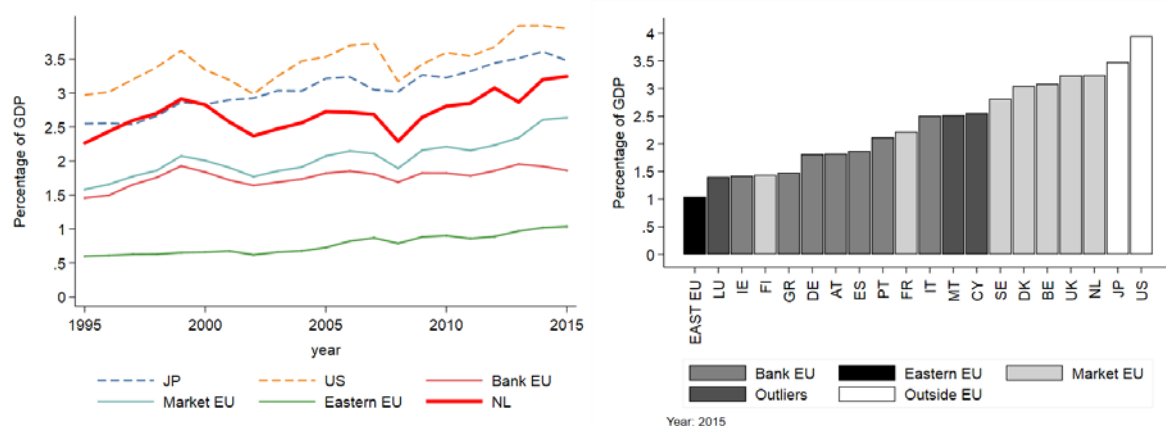
4. Household finances

Looking at the bank credit and market mechanisms for the funding of corporations is the first step of examining the financial sectors. We should not forget that the funding is ultimately related to household finances in various forms.

Having examined the bank credit and market mechanisms for firm financing, we should not, however, forget the important role of household finances in the process of firm funding. Households save their wealth in various forms. They keep part of their capital in savings accounts, which is then partly used by the banks to offer credit. They buy shares, which help firms finance their activities. Lastly, they also save part of their wealth in pension schemes. These funds are used for the finance of firms through the acquisition of shares and bonds by the pension funds. Therefore, we present a related view of the channels of firm financing by focusing on household finances in this section.

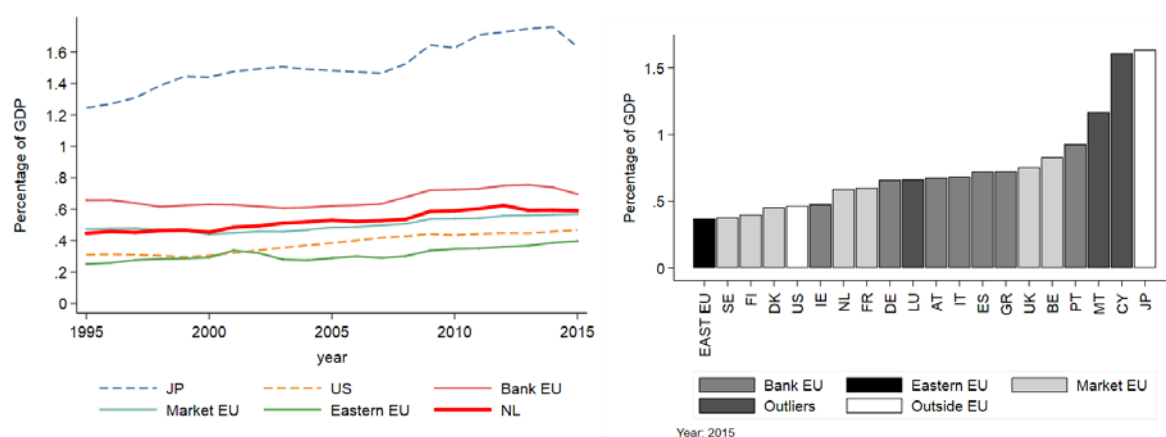
First, we look at the total financial assets of households relative to GDP across countries in Figure 4.1. The US and Japan have the highest level of total assets relative to GDP but as we will see later on, this is due to different asset categories being prominent for each country – namely deposits for Japan and shares for the United States. Market-based countries have a higher level of total financial assets than bank-based EU countries; however their levels evolve relatively close over time. The Dutch households have more total financial assets than the rest of the European countries. However, as we see in the following figures, these assets are mainly illiquid (i.e. insurance, pension and standardized guarantees). Finally, the Eastern European countries score significantly lower than the other groups.

Figure 4.1: Household total financial assets as a fraction GDP



As a second step, we look at three main components of total financial assets, namely deposits, shares and equity, and insurance and pensions in Figure 4.2, Figure 4.3 and Figure 4.4, respectively. In line with findings so far, Japan has the highest share of household deposits as a fraction of GDP. Over time, the bank-based EU countries have a higher share of deposits compared to the market-based countries, with the US and East Europe following up. However, when observing the deposits on a country level, we see a more mixed picture, with two market-base EU countries, namely the United Kingdom and Belgium having one of the largest levels of deposits.

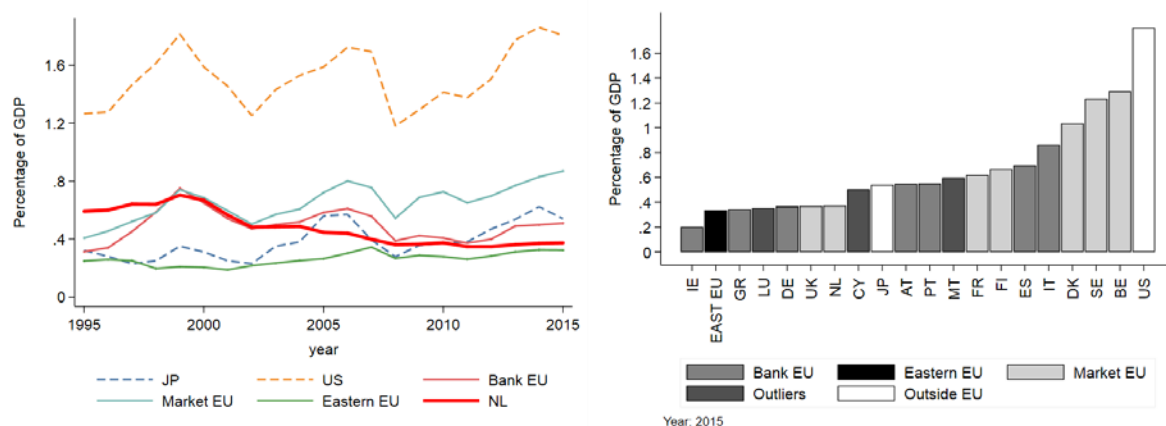
Figure 4.2: Household deposits as a fraction of GDP



The holding of shares and other equity fluctuates more than the deposits over time. We observe significant increases in 2000 and before the financial crisis among

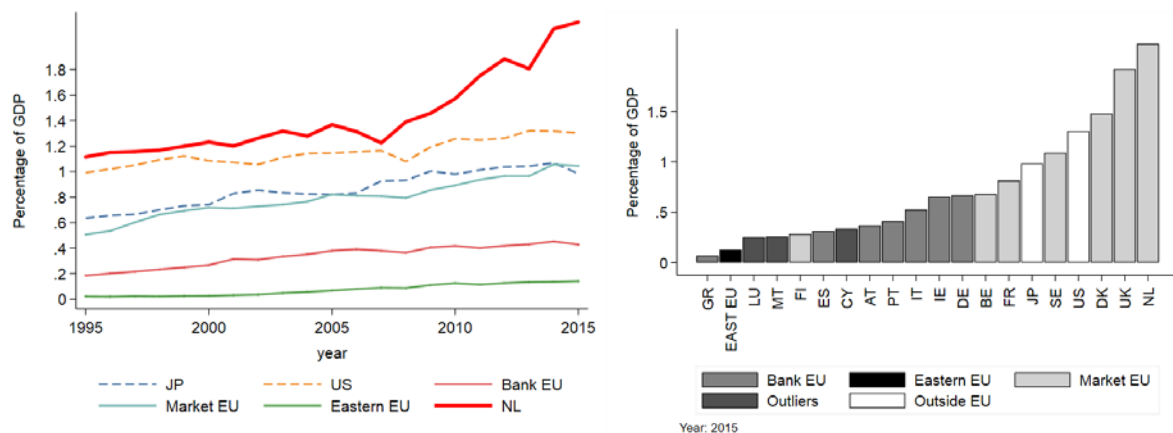
different groups. During the last few years the amount of shares and other equity is increasing for all groups except the Eastern European countries. When we look at the right panel side of Figure 4.3, we see that the US and market-based EU countries are holding a larger amount of shares. However, a number of bank-based EU countries also score high in this indicator.

Figure 4.3: Household shares and other equity as fraction GDP



When looking at the illiquid household assets, the Netherlands has the highest levels of insurance, pension and standardized guarantees. Dutch households face a steep increase of their illiquid assets since 2007. The technical provisions of Dutch pension funds have more than doubled between 2007 and 2015. This is due to revaluations rather than changes in volumes. To a large extent, the increase in insurance and technical reserves is driven by a long-term downward trend in capital market rates (van der Wal, 2016). Regarding the country groups, the US have the largest household insurance, pension and standardized guarantees over time followed by Japan and the market-based EU countries which evolve at the same levels over time in Figure 4.4. The bank-based countries have high levels of reserves while the amounts are barely above zero for the Eastern European countries. The market-based countries are performing well in 2015, with the United Kingdom and the Netherlands having a higher fraction of technical reserves over GDP than the US.

Figure 4.4: Household insurance, pension and standardized guarantees as fraction GDP



It is also useful to look at the relative performance of each asset class. We now compare each indicator relative to the total financial assets. Japan again holds the highest household deposits as a fraction of the total financial assets in Figure 4.5. We see a clear distinction between groups, with bank-based countries holding a bigger share of their wealth in deposits and market-based countries a smaller one. The Eastern European countries stand in between the two groups. The US has the lowest level of deposits compared to the rest of the groups and this remains unchanged over the years.

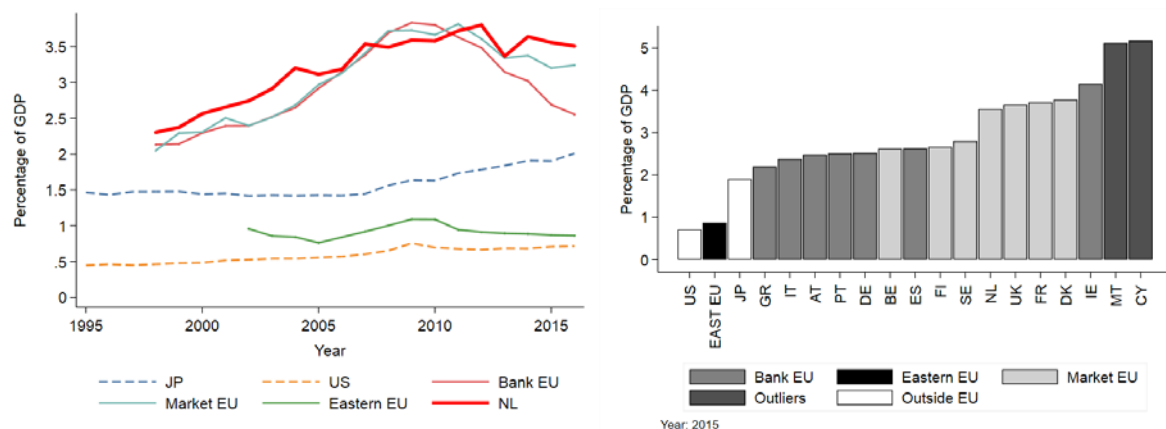
5. Structure of the banking sector

As we have already shown, bank intermediation is crucial for the funding of non-financial firms. Firms at bank-based countries, like Japan, rely to a great extent on banks for the financing of their activities. All European countries – except for the Eastern European group – rely to a great extent on bank credit as shown in Figure 5.1. Therefore, the structure of the banking sector is of a great importance for the functioning of bank intermediation. In this section we examine the development of structure of the banking sector among different groups. More specifically, we analyze the size of the banking sector, the ownership structure, the importance of the foreign markets, competitive parameters and profitability.

Bank assets

The total assets of the European banks increased substantially until 2011 in Figure 5.1. Since then, we observe a steady decrease, which is mostly due to the fact that banks need to shorten their balance sheets in response to the crisis. First, European bailed-out banks, which received State Aid from the European Commission, were required to raise their capital ratios as part of their state support plan. Second, the 9 per cent capital requirement set by the European Banking Authority in 2011/2012, as part of its Capital Exercise to restore confidence in the EU banking sector, led to significant restructuring of the banks. Third, the introduction of Basel III and the strict requirements for higher Tier 1 capital led to the deleveraging of the European banks and, as a consequence, to lower levels of their total assets. Countries that are considered outliers – namely Cyprus and Malta – have the largest levels of total banking assets as a share to GDP. Japan, the Eastern Europe and the US have relatively smaller banking sectors to their respective economies, and they appear to be more stable in terms of size after the crisis compared to bank-based and market-based EU.

Figure 5.1: Total banking assets¹⁴



Cross-border links

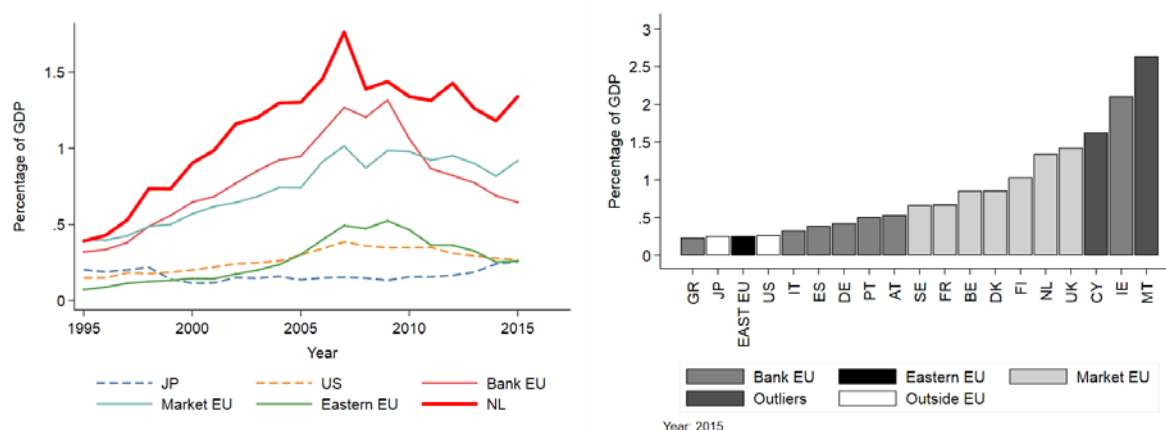
Banking systems not only differ in terms of size but also in terms of how international they are. Since we observe higher levels of total banking assets for the market-based and bank-based EU countries, we want to examine the cross-border assets as a plausible explanation of this development. Indeed, in Figure 5.2, the aforementioned country groups hold a larger amount of cross-border assets. The high levels of cross-border assets for the bank-based EU countries are mainly driven by Ireland. Ireland has more than four times bigger volumes of cross-border assets compared to the rest countries in the group. As the amount of foreign assets for Ireland is decreasing since 2009, we do observe a significant decrease over time for the whole group. Ireland's level of foreign assets as a fraction of GDP falls from 4.9 in 2009 to 2.1 in 2015. As a result, the levels of the bank-based EU group reduce also by fifty percent. In contrast, we observe more stability in the levels of the market-based group. Since 2006, the group evolves around 1, meaning that cross-border assets account for the same amount as the GDP of the country. The US, Japan and Eastern Europe have a very low amount of foreign assets as a share of GDP. As expected, outlier countries, such as Luxembourg and Malta, score the highest in cross border links.

The Netherlands hold a higher level of foreign assets than most market-based EU countries. Foreign claims' levels have peaked up in 2007, right before the crisis outburst, and have fallen ever since. The sales of some business units of ABN AMRO, following its acquisition by a foreign banking consortium, and ING, as a

¹⁴ Luxembourg was excluded from the country comparison graph for easier readability, since its figures are four times bigger than Malta, which ranks second.

condition imposed by the European Commission for the State Aid support it received, can at least partly explain this development.

Figure 5.2: Cross-border assets as a fraction of GDP¹⁵



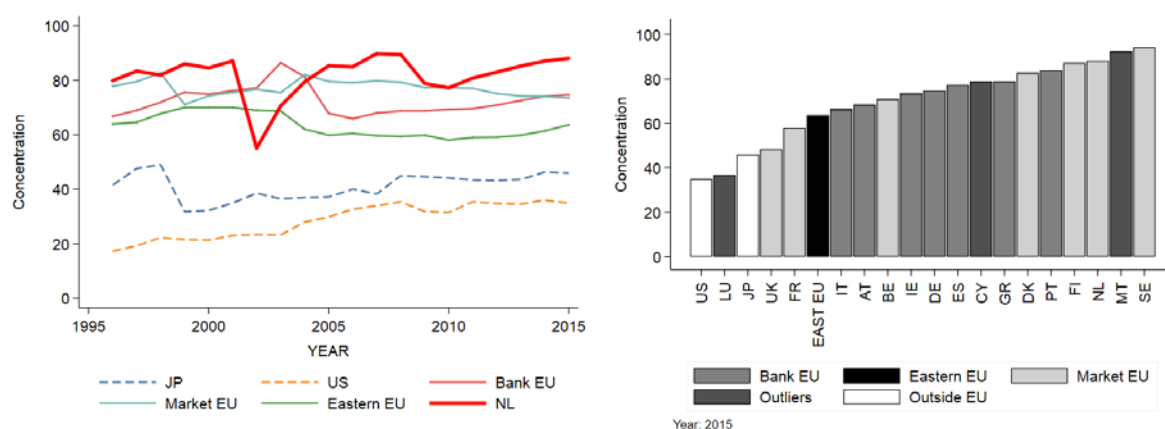
Concentration

We, subsequently, focus on the structure of the banking sector by looking at its concentration, measured by the market share of the three largest banks in Figure 5.3. The US and Japan score relatively low in comparison to the European countries. This indicates that their markets consist of many relatively small banks in comparison to fewer and bigger banks in Europe. The Eastern European countries have the lowest market concentration amongst the European countries. The bank-based and market-based EU countries converge after the crisis, although the latter have a slightly higher concentration before 2007.

The level of concentration in the Netherlands remains high. Although there was a decrease in 2009, the concentration is increasing ever since. This trend can be attributed to many recent developments. First, several acquisitions of smaller banks occurred since 2010 (e.g. Fortis, Friesland Bank). Second, foreign banks, which entered the market in 2010, reduced afterwards their activities in the Dutch market significantly. Third, the ban by the European Commission on price leadership, imposed on all banks that received state aid during the crisis, might have further hindered competition.

¹⁵ Luxembourg was excluded from the right-hand side graph. It's figures were six times higher than the second country with the highest cross-border assets, Malta.

Figure 5.3 Market share of three largest banks (C3)

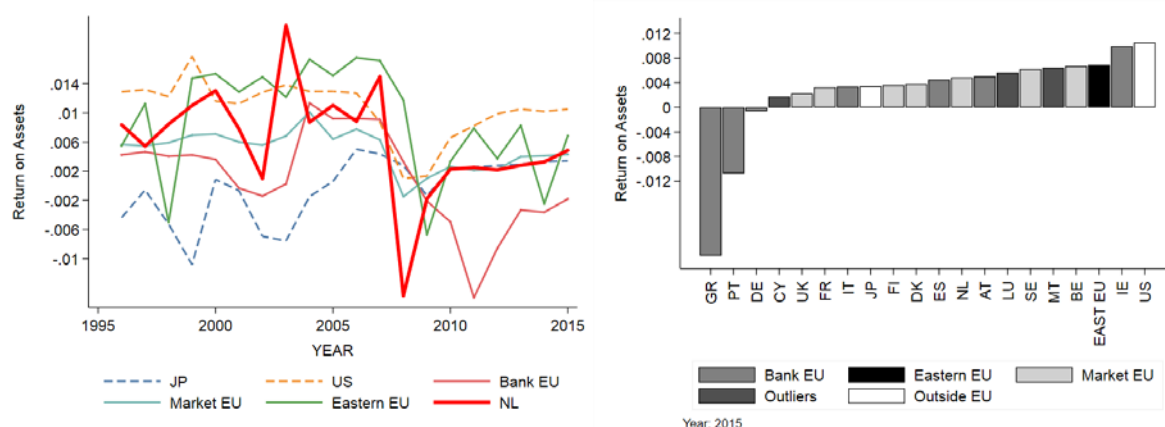


Profitability

We then look at the profitability of the banking sector in each country. We capture its development by looking at three indicators, namely return on assets, net interest margin and interest revenue as a fraction of bank income in Figure 5.4, Figure 5.5 and Figure 5.6, respectively. We do not observe a clear trend among country groups regarding the return on total assets. The US and Eastern EU countries have higher return on assets. Most of the outlier countries (Malta and Luxembourg) score high. The bank-based EU countries score low due to the fact that their banking sectors were severely affected by the crisis and are still recovering from it (i.e. Greece and Portugal) with the exception of Ireland. The steep decrease for the Netherlands during the crisis can be a result of a weaker economic environment and stricter regulatory requirements (Daniels and Kamalodin, 2016).¹⁶

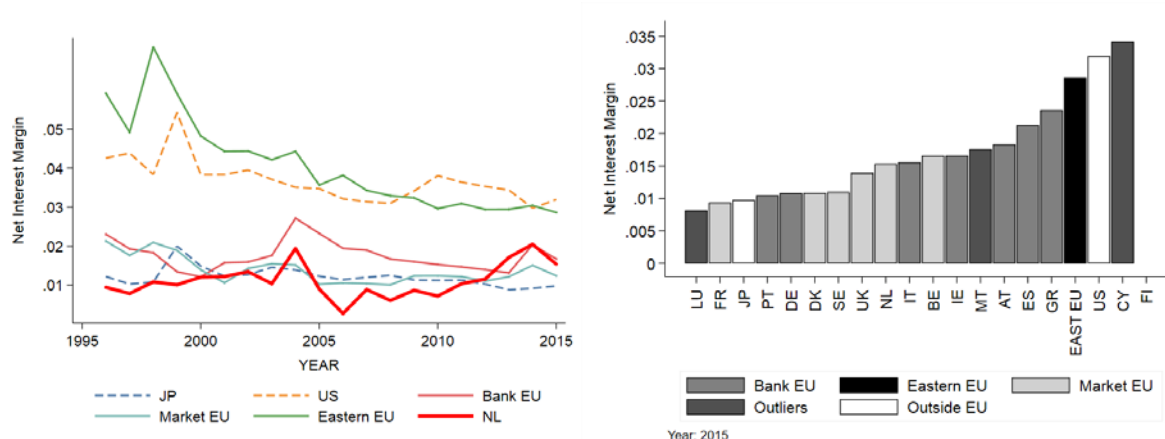
¹⁶ Note that return on equity (ROE) is used as a profit indicator in Daniels and Kamalodin (2016). We find that both ROA and ROE show very similar trends for Dutch banks.

Figure 5.4 Return on assets



The net interest margin is steadily decreasing for all country groups in Figure 5.5. Again the US and Eastern European countries have the highest performance for this indicator. The bank-based, market-based EU and Eastern European countries have a higher net interest margin than Japan but lower than the US.

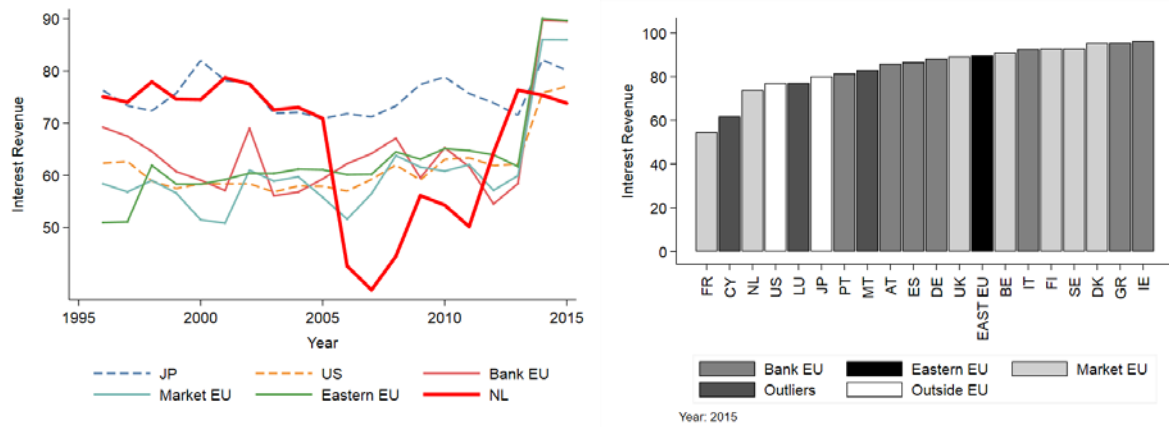
Figure 5.5 Net interest margin



Last, we look at the interest revenue of the banks as a fraction of their income in Figure 5.6. Japan has the highest interest revenue among all country groups until 2014. During 2015, we observe no clear trends among country groups. The countries with the highest interest revenues belong both to the bank-based and market-based EU countries. However, this indicator is rather volatile over time. In the Netherlands banks' business models are highly reliant on interest income, which accounts for

roughly 80% of the total income before the crisis. The decline in interest rate and low credit growth may have reduced interest income for Dutch banks during the crisis (IMF, 2017). However, it gradually returns to the pre-crisis level.

Figure 5.6 Interest revenue as a fraction of bank income¹⁷



¹⁷ The jump in the data occurs due to a data source change.

6. Conclusion

In this paper, we re-examine the structure of the financial sector, with a focus on firm financing, household assets and the structure of the banking sector of the 28 EU member countries, Japan and the United States. We construct an extended panel dataset of 25 indicators during the period 1995-2016. Using principal components analysis as in Bijlsma and Zwart (2013), we categorize the European countries in different groups, namely Eastern European members, market-based countries, bank-based countries and the outliers – countries with a significantly large banking sector. We observe three main differences between the 2006 and 2015 classifications. First, Ireland is now classified as a bank-based country rather than an outlier. Second, Denmark and the Netherlands belong to the market-based group instead of the bank-based before the crisis. Last, the differences between the United States and the rest of the groups become larger mainly due to an increase in venture capital financing for the US and not for the rest of the groups.

Since our data cover the period until 2016, we can examine how financial sectors have developed before and after the 2007/8 global financial crisis. We observe a decline in bank credit to non-financial firms, especially in the bank-based EU countries and Eastern European countries. We also observe reduced volumes in stock market activities during the crisis. Since 2015, we see a recovery for the US, Japan and the market-based EU countries.

Firms rely mostly either on bank credit or equity financing. Financing through corporate bonds remains low but has substantially increased compared to the pre-crisis level for all groups except for the bank-based EU countries. In recent years, the use of venture capital is increasing in the US and higher levels of factoring volumes are observed for the EU countries. It is worth noting that for all country groups alternative forms of financing are growing rapidly but they remain a small part of the overall financing activity.

Regarding the Netherlands, we observe some shift from bank to market and new forms of finance. While bank credit to non-financial firms has stagnated during recent years, there is a slight increase in the size of corporate bonds and venture capital markets. Stock market capitalisation has also recovered to the pre-crisis level. Even though new forms of financing, e.g. factoring remain small in comparison to other traditional financing forms, they have increased considerably over time, which

may have helped to alleviate the financing difficulties of the Dutch SMEs to some extent.

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Appendix A: Data description

Indicator	Source	Additional Information
Bank credit to private sector	World Bank	Domestic credit to private sector by banks (% of GDP)
Bank credit to non-financial firms	ECB, FRB, Bank of Japan, Eurostat, OECD, Bezemer et al. (2017)	Loans vis-à-vis Non-Financial corporations reported by MFI excluding ESCB (stocks)
Corporate bonds	Bank of International Settlements, Eurostat, OECD	Total debt securities by residence of non-financial corporation (amounts outstanding)
Outstanding securitized loans	SIFMA, Bank of Japan, Eurostat, OECD	Securitization Outstanding U.S. Non-Agency CMBS and RMBS Outstanding U.S. Asset-Backed Securities Outstanding
Stock market capitalisation	World Bank, World Federation of Exchanges, Federation of European Securities Exchanges, London Stock Exchange, Nasdaq Nordic, Sofia Stock Exchange, Borsa Italiana, Eurostat, OECD	Market capitalisation of listed domestic companies
Gross issuance of listed shares	ECB, Federal Reserve, Bank of England, Eurostat, OECD	Gross issues of local currency listed shares by residents
Venture capital investment	EVCA, NVCA, VEC, Eurostat, OECD	Venture Capital Investment value
Cross-border mergers and acquisitions	UNCTAD, World Bank	Cross border M&A (by country of seller) - flows
Factoring	FCI, EUF, Eurostat, OECD	Total factoring volume
Crowdfunding	European Commission, Eurostat	Crowdfunding amount raised
Angel Investment	EBAN, Eurostat	Angel Investment volume
Household financial	OECD, Eurostat	Household Financial Assets

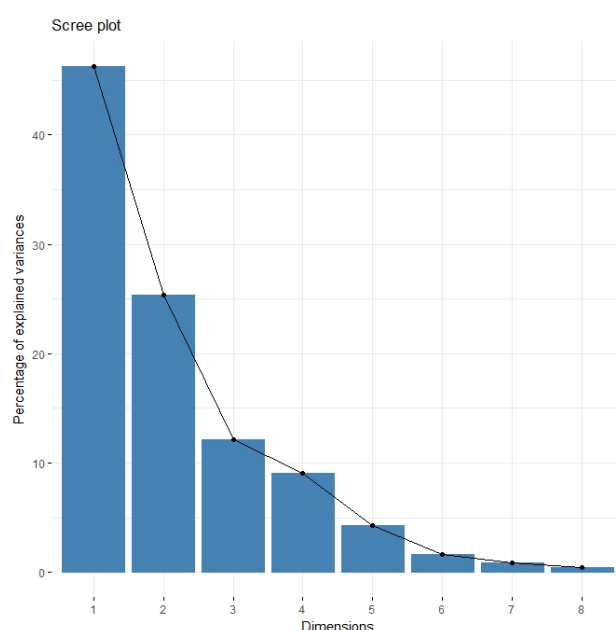
assets		
Household deposits	OECD, Eurostat	Household Deposits
Household shares and other equity	OECD, Eurostat	Household Equity and Investment Fund Shares
Household insurance, pension and standardized guarantees	OECD, Eurostat	Insurance pension and standardized guarantees
Size banking sector	Eurostat, Federal Reserve, Bank of Japan	Total Assets of Banks (amount outstanding)
Cross Border Assets	Bank of International Settlements	External positions of reporting banks vis-à-vis individual countries (amounts outstanding)
Competition measure – C3	World Bank	Assets of three largest banks as a share of assets of all commercial banks.
ROA	World Bank	Average Return on Assets (Net Income/Total Assets)
Net Interest Margin	World Bank	Accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets.
Interest revenue	World Bank	Bank interest income to total income (%)

Appendix B: Principal Component Analysis

To classify the EU28 countries into groups, we use Principal Component Analysis (PCA). PCA is a technique that identifies linearly uncorrelated components from a set of possibly correlated variables. These components are then used for clustering countries into different groups. In this paper, we employ a subset of 8 indicators that capture the various channels of financial intermediation. The channels used in the PCA analysis are the following:

- Credit to non-financial firms as a percentage of GDP,
- Corporate bonds outstanding as a percentage of GDP,
- Total stock market capitalisations as a percentage of GDP,
- Venture capital investment as a percentage of GDP,
- Household deposits as a percentage of GDP,
- Household shares and other equity as a percentage of GDP,
- Banking assets relative, to GDP,
- Foreign assets of banks as a percentage of GDP

Figure A.1: Percentage of variance explained by each component for 2015



PCA uses these 8 indicators to formulate components. Figure A.1 and table A.1 show that the first two components of the principal component analysis explain 71% of the cross-country variance. Therefore, we choose these first two components of PCA and use them to classify the countries into groups through K-means clustering. K-means clustering intends to partition observations into k clusters in which each observation belongs to the cluster with the nearest mean. The objective of K-means clustering is to minimize total intra-cluster variance. At this point, we should note that the number of clusters k needs to be specified *a priori*.

Table A.1: The Components

Component	Eigenvalue	Proportion	Cumulative
Comp1	96.2731	0.4629	0.4629
Comp2	52.7045	0.2534	0.7163
Comp3	25.1840	0.1211	0.8374
Comp4	18.8076	0.0904	0.9278
Comp5	8.87718	0.0427	0.9705
Comp6	3.42265	0.0165	0.9870
Comp7	1.73153	0.0083	0.9953
Comp8	.999440	0.0048	1.0000

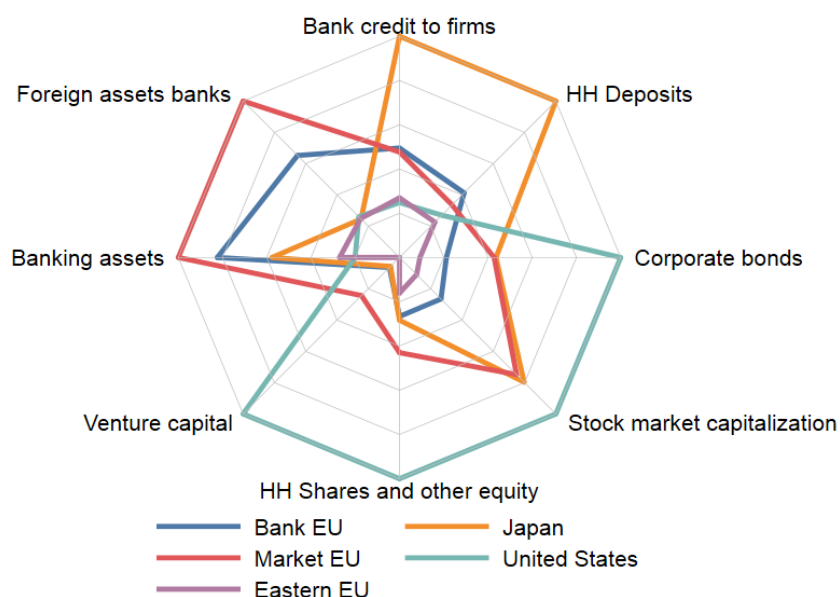
To further understand the drivers of the assignment of countries into different groups, we compare the underlying financial system characteristics of the market-based EU countries and bank-based EU countries with those of the US and Japan. Figure A.2 shows the 8 indicators we use in PCA analysis for the years 2006 and 2015. Each of the axes represents the relative size of the indicators. We normalize the largest value of each indicator to 1 and then compute the value of the same indicator of the respective group relative to that of *the best performer*. For example, for the indicator *bank credit to firms*, Japan has the highest level of bank loans to private non-financial firms relative to its GDP, which is normalized to 1. *Bank credit to firms* is considerably smaller in bank-based (0.56) and market-based EU countries (0.5), which is around half of the size of Japan in 2015. The US has the lowest value (0.26), which is one quarter of the size of Japan.

As a typical market-based economy, the US has the highest scores in the equity related indicators and is followed by the market-based EU countries (e.g. the United Kingdom and the Netherlands). An interesting finding is that Japan scores relatively

high for the size of stock market capitalisation and corporate bond at around the same level as that of the European market-based countries.

Regarding the bank-related indicators, the pattern is more mixed. Japan has the highest score for household deposits and bank credit to firms, while the US has lower scores in these dimensions. We do not observe much difference between the bank-based and market-based EU countries. Market-based EU countries also have a large banking sector measured by bank assets. This could be related to the fact that foreign bank assets play a more important role for the market-based EU countries. This finding is in line with Bijlsma and Zwart (2013).

Figure A.2: Comparison of market-based EU, bank-based EU, the US and Japan in 2015 based on eight indicators





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