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ups and downs of a sample of large and
complex financial institutions since the
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THE RISE AND FALL OF UNIVERSAL BANKING: UPS AND DOWNS OF A SAMPLE OF LARGE AND COMPLEX FINANCIAL INSTITUTIONS SINCE THE LATE '90S

by Sergio Masciantonio^{a,b} and Andrea Tiseno^a

We document the development of the major international banks since the late 1990s, analysing balance-sheet data for 27 large and complex financial institutions. We argue that balance-sheet expansion and business line diversification paved the way for the rise of the universal banking model. This model, apparently sound and efficient in the run-up to the crisis, revealed all its shortcomings when the crisis erupted. European banks displayed greater fragilities in their business models. The changed financial and regulatory landscape that followed has challenged this model further. Many proposed remedies to the global financial crisis appear to push for a return to a narrower model for banking activity.

JEL classification: G21, G01

Keywords: banks, banking crises, financial crises, balance sheets

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1. Introduction and Summary¹

The deregulation of the banking sector that started in the 1980s has blurred the borders between traditional and investment banking, paving the way for the development of universal banks, which are involved in any kind of banking and financial activity (De Grauwe, 2008). This process gained momentum from the end of the 1990s as a result of several factors: the liberalization of capital flows beginning in the previous decade, which allowed a rise in cross-border banking activities, changes in accounting and regulatory standards, technical innovation, and a higher degree of financial innovation.

The banking sector has thus undergone a significant and rapid transformation since the late 1990s, with several of its consequences still subject to investigation. The global financial crisis, which began in 2007, has proved to be a major breakpoint in universal banking activity and performance. Its impact and legacy are still unfolding and are worth analysing in detail. Moreover, the state of the banking sector is deeply intertwined with the state of the broader economy. Global banks enhance the international transmission of shocks through their activities, contributing to more integrated global business cycles (Goldberg, 2009).

The purpose of this paper is to document some stylized facts concerning the sector's transformation. We track the balance-sheet evolution of the largest banks in Europe and North America over the last decade. The reason why we restrict our analysis to large banks is that these have experienced more radical changes compared with small, savings or regional banks. The former were big enough to compete in an increasingly globalized and integrated financial system, and had a more appropriate structure to react quickly to regulatory changes and financial innovation and compete against banks with different business models. Smaller banks were less affected by this evolutionary path. Moreover, the largest banks typically feature among those defined systemic. Hence, we chose a sample of 27 large (or most important, in our judgement) banks still in business at the end of 2011. Given the massive degree of financial innovation during the last decade and its profound impact on banks' activities, the label Large and Complex Financial Institutions (LCFI) looks particularly well-suited to these institutions.

From our analysis we can pinpoint the following stylized facts in the run-up to crisis in the summer of 2007:

¹ The authors would like to thank Giuseppe Grande, Aviram Levy, Marcello Pericoli and Andrea Zaghini for useful comments and suggestions. The opinions expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Italy. All remaining errors are our own.

- Sheer asset growth: banks' balance sheets grew to enormous sizes compared with their home countries' GDP. This was particularly true for banks in Europe, where the financial system is more bank-based. Balance-sheet growth was impressive in the run-up to the global financial crisis, slipping back only slightly in the most recent years. Again, European banks provided the bulk of this growth during the last decade.
- Leverage grew massively, fuelling asset growth and changing direction during the crisis years. The consolidation that occurred throughout the period under examination was another main factor behind asset growth.
- The massive debt-fuelled asset growth underpinned the expansion of retail and universal banks' activities in fields traditionally the preserve of investment banks, providing more revenues but also more risks.
- Maturity mismatches and funding risk also grew in the run-up to the crisis. European banks, which are more reliant on wholesale funding than their North American counterparts, proved to be more exposed to these risks. More in general, the investment bank funding model, which relies heavily on wholesale funding, was intrinsically prone to these risks.
- These developments led to an ever increasing profitability (as measured by ROE) during the boom years that followed the burst of the Dot-com Bubble.

Since 2007, when the crisis broke, things have changed swiftly. We can sum up the following stylized facts for the crisis years:

- Profitability dropped sharply and turned negative for several quarters, revealing all the fragilities embedded in the balance sheets of banks, which came out of the crisis severely weakened. The surge and subsequent fall of profitability was sharper for European banks. Profitability then recovered only to a fraction of the pre-crisis level in a completely changed financial landscape.
- The losses experienced by banks emerged via three main channels. First, they arose from lending activity connected with the slump in the housing market, especially in the US, and the global recession in 2009. Second, trading activity – once the golden goose of universal banking – suffered enormous losses, affecting almost every bank. Third, an unprecedented level of extraordinary losses, connected with large write-downs and exceptional activities, was experienced.
- The sovereign debt crisis severely affected European banks, which recovered at a slower pace than their North American counterparts.

- Deleveraging is one of the main challenges banks have faced in the aftermath of the crisis. Undercapitalization – coupled with excessive asset growth – was identified as one of the banks’ main weaknesses. As a result, the bulk of regulatory efforts concentrated on strengthening capital bases. The increase in their capital bases by all the banks in the sample, together with a stand-still in asset growth, has been at the root of the massive deleveraging of recent years.
- The dysfunctional interbank markets and the liquidity crunch encouraged banks to pile up increasing amounts of unallocated liquidity. However the sample is very heterogeneous: most of French, Italian and Spanish banks maintained a liquidity ratio broadly in line with its pre-crisis level, while some other banks (like English and Swiss banks) accounted for most of the increase in the average liquidity ratio. Another cause behind this surge in the liquidity ratio may be identified in regulatory changes.

Taken together, these features have put the universal banking model under serious stress. Making the banking system safer might be inconsistent with the return to pre-crisis profitability levels. The US and UK authorities have identified the excessive risk-taking embedded in trading activity as one of the main threats to banking stability and have proposed – in various forms – the separation of investment banking from retail banking. This could even mark the end of the universal banking model as it evolved during the 2000s.

The paper is structured as follows. Section 2 describes the sample. In Section 3 we illustrate the path of LCFIs’ growth in size and leverage, while in Section 4 we describe the increased activity diversification and the funding model. Section 5 analyses the impact of the crisis on banking activity and profitability. Section 6 deals with the main legacies of the crisis. Section 7 concludes.

2. The Sample

We selected a sample of 27 banks, aiming to encompass all the “most important” large and complex financial institutions in Europe and North America operating throughout the decade and still in business at the end of 2011 (see Table 1). The first criterion adopted in our selection process was bank size, measured by total assets, at the end of 2011. Among the banks listed we dropped Fannie Mae and Freddie Mac, though sometimes considered bank-like institutions, given their peculiar mortgage-based business model and their nature of government-sponsored enterprises (GSE). As a second criterion, all the insurance companies with a minor banking arm

were excluded from the sample (i.e. AXA, Allianz, Metlife, etc.). Thus, the only financial institution considered in the sample with substantial insurance activity is the Dutch ING Group. Finally, given the significance of investment banking activity because of its higher risk profile, we chose to include in the sample two smaller financial institutions that focus mainly on investment banking: Natixis and Bank of New York Mellon² (see Annex 1 for a chart of banks' total assets, risk weighted assets and total common equity).

Table 1. List of selected LFCIs and their assets at the end of the 2011 financial year

Bank	Country	Total Assets (€ bn.)
BNP Paribas	France	1,989
HSBC	UK	1,964
Deutsche Bank	Germany	1,897
Barclays	UK	1,736
Royal Bank of Scotland	UK	1,689
Bank of America	USA	1,615
Credit Agricole SA	France	1,588
JP Morgan	USA	1,579
Citigroup	USA	1,401
ING Groep	Netherlands	1,238
Banco Santander	Spain	1,200
Lloyds Banking Group	UK	1,152
Société Générale	France	1,127
UBS AG	Switzerland	1,046
Wells Fargo	USA	938
Unicredit	Italy	918
Credit Suisse Group AG	Switzerland	818
Commerzbank	Germany	751
Nordea Bank AB	Sweden	719
Goldman Sachs	USA	675
Intesa San Paolo	Italy	653
Morgan Stanley	USA	602
BBVA	Spain	591
Dexia	Belgium	564
Royal Bank of Canada	Canada	542
Natixis	France	455
Bank of New York Mellon	USA	184

Source: Datastream.

Note: where end of 2011 data are not available, data from 2011 Q3 appear.

² It is interesting to note that our sample is very close to the sample of G-SIFIs selected by the FSB in cooperation with the BIS (for further details see “Policy measures to address systemically important financial institutions (SIFIs)”, FSB, November 2011 and “Update of group of global systemically important banks (G-SIBs)”, FSB, November 2012). Since our analysis is restricted to European and North American banks, the two G-SIFIs we are not considering – taking into account the 2012 exercise, which is indeed based on 2011 data – are State Street and Standard Chartered. Another G-SIFI, Banque Populaire Cde, is the parent company of Natixis. It is therefore to some extent included in our sample. However, our sample is richer as it includes four non-G-SIFI banks: Lloyds Banking Group, Commerzbank, Intesa San Paolo and Royal Bank of Canada (the first two being part of the G-SIFIs sample in the 2011 exercise).

Our data source is Bloomberg. Given the relatively short time span (1998-2011), we use quarterly data, which are reported on a yearly basis in order to get rid of seasonal effects.³ When quarterly data are not available (most English and French banks publish their financial statements semi-annually with only a few figures published quarterly), missing data are imputed with the econometric methodology outlined in the appendix (see Annex 2).

3. Size, Growth and Leverage

Bank size has grown massively during recent years, mainly through the increase in the sector's leverage and consolidation. The changes have been sharper for European banks. Our sample includes 8 North American (7 from the US) and 19 European banks (12 from the Eurozone). Even if the largest American banks are similar in size to the largest European banks, there is a striking difference when asset size is compared with home country GDP. The level of total assets of many European banks exceeds – or is very close to – their country's GDP level, whereas American banks' total assets are far lower. This difference comes from the bigger role that European banks have in their financial system, which is certainly more bank-based than the American one. Thus, American banks occupy a far smaller role in their financial system, than their European counterparts. European banks appear very large with respect to the size of their home countries and might be more plausible to relate them to the size of the European Union, as the reference horizon of their activity spans the whole continent. In this case, European banks' size would be much more similar to their North American counterparts. However, the EU lacks the common bankruptcy policy, supervisory authority and deposit insurance policy needed to make it comparable with the US, and a common monetary policy is a feature of only a sub-sample of member countries.

Many of these banks evolved into universal banks during the period under review, expanding their activities in several fields and hence also their balance sheets. The rise of universal banking can be explained through the deregulation of the banking sector during the 1990s. In Europe, the Second Banking Directive (which came into effect in 1993) endorsed the principle of universal banking, allowing “credit institutions” to engage in any financial activity, and removed the obstacles to cross-border banking (Benink and Benston, 2005). Similarly, the repeal of the six-decade old Glass-Steagall Act in 1999 allowed American banks to conduct almost any financial

³ Quarterly flows data are presented on a yearly basis calculating the moving sum of the last four quarters' data. Thus, data for 1999 Q1 also account for results for 1998 Q2:Q4.

activity (Barth et al., 2000). A brief survey of the other main drivers of development in the banking sector can be found in Panetta et al. (2009a).

This deregulation led to the considerable growth of banks. However, the total assets of the European banks in our sample have increased far more than those of their North American counterparts (Chart 1, left-hand panel). This massive growth affected virtually the whole sample of European banks, with UK and Swiss banks ahead of the others. Interestingly, the UK and Switzerland are the two countries with the highest ratio of banking assets to GDP and whose banking sector was most severely affected during the 2007-08 crisis. This is not surprising as they are the largest financial hubs of the European economy.

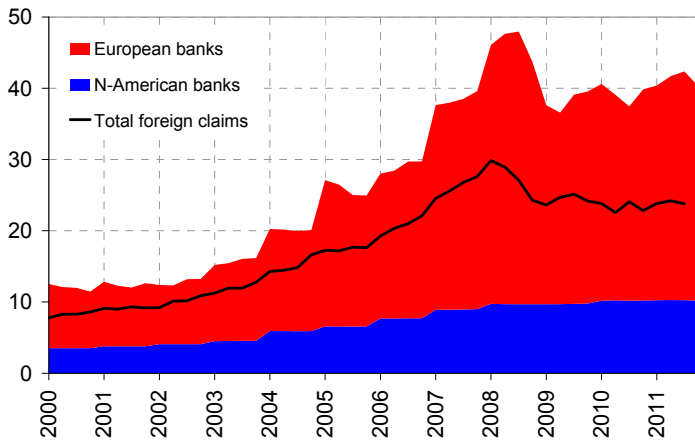
As can be seen from Chart 1 (left-hand panel), 2008 had been a turning year in asset growth for European banks, with their total level of assets averaging \$30 trillion at the end of 2011 – down from a peak of \$38 trillion in 2008 Q2. Understanding the main drivers of this enormous growth is certainly important. Probably, globalization and increased financial integration – particularly important inside the EU after the introduction of the euro – played a by no means negligible role, as evidenced by the growth path of foreign claims for the banking sector as a whole during the same period.⁴ In fact, at the end of 2011, all the banks in the sample can be considered truly “global” banks as they operate under several jurisdictions. Some of them, like HSBC or Banco Santander, have more than two thirds of their assets and revenues located outside their home countries and several other banks have a substantial share of their business in emerging markets. The increase in cross-border banking and the rise of interconnectedness, particularly in Europe, have proved a tough challenge for the several national supervisory authorities.

The expansion of banks’ balance sheets coincided with the ballooning of the derivatives market (Chart 1, right-hand panel). The growth path of the amount outstanding of OTC derivatives during the decade is strikingly similar to the path followed by banking assets. Although American banks include a larger share of pure investment banks – always more heavily involved in financial engineering – financial innovation is likely to have deeply affected most of the banks in the sample. As previously noted, growth in derivatives dealership was surely fostered by banking sector deregulation.

⁴ Foreign claims, in the BIS definition, are calculated as the sum of banks’ cross-border claims and local claims of foreign affiliates in foreign and local currencies. For further information see “Guideline to the International Consolidated Banking Statistics”, Bank for International Settlements, 2012.

Chart 1. Growth of bank size

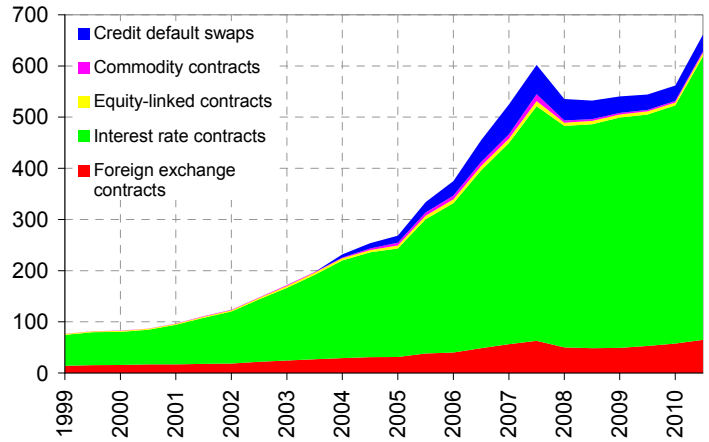
Total assets and foreign claims (\$ tn.)



Source: Datastream, BIS and authors' calculations

Note: Total foreign claims are intended for the whole banking system, while total assets are computed only for the banks in the sample

Outstanding derivatives (\$ tn.)



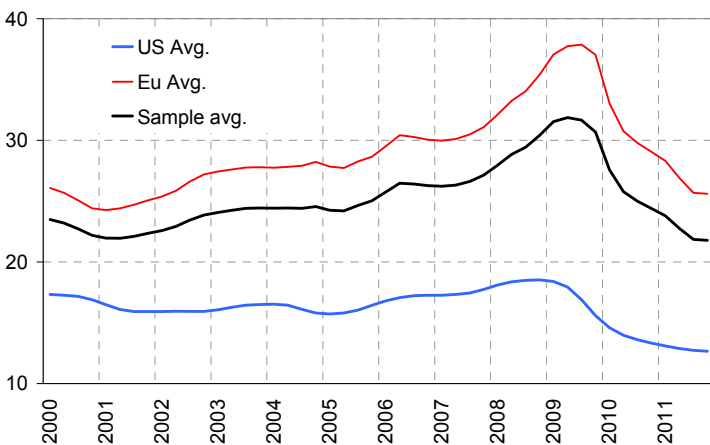
Source: BIS

Note: Outstanding notional amount is considered

Given the main drivers of the enormous growth of the banks included in our sample, it is no less important to investigate how this process unfolded. Regardless of the retained earnings policy – traditionally a minor channel of asset growth – two main channels emerge: growth through increased leverage and growth through increased concentration (that is, through M&A). Even if these two channels partially overlap – given the role of LBOs in M&A activity – their distinct role, especially before the crisis erupted, emerges plainly from the data.

Chart 2. Increase in leverage and consolidation

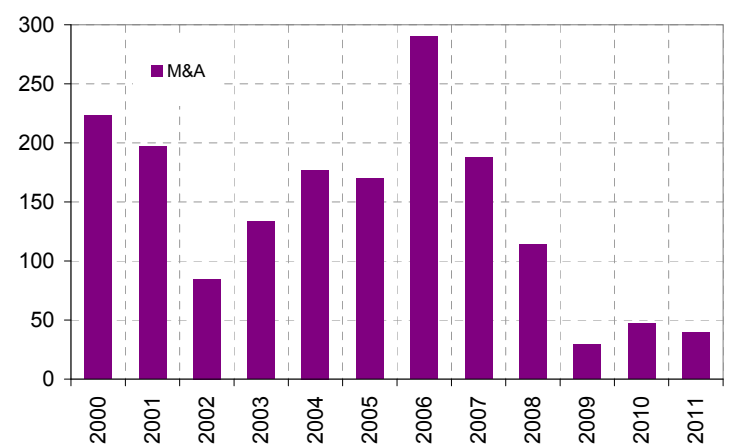
Leverage



Source: Authors' calculations based on Bloomberg data

Note: Leverage calculated as the ratio between total assets and total common equity for each bank; mean values are then calculated with the single-bank leverage data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation).

M&A (€ bn.)



Source: Authors' calculation based on Thomson Reuters data

Note: M&A operations within the financial sector in Belgium, Canada, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland, UK, and USA.

The leverage ratio – calculated as the ratio between total assets and total common equity – grew almost uninterruptedly from 2000, when it stood at 22 for the entire sample, until early 2009, when it reached the record level of 32 (see Chart 2). We can well conclude that at least part of the asset growth relied on an increase in leverage. Moreover, a closer look at the two subsamples provides some more insights. Although the curves for European and North American banks are not easily comparable given the different accounting standards in use, overall we find at least some important differences.⁵ The leverage ratio for North American banks remained fairly stable through the first half of the decade, increasing only very slightly in 2007 and 2008. By contrast, the European leverage ratio grew impressively to a maximum level of 38 in 2009, with some banks (i.e. Deutsche Bank, Commerzbank, Société Générale, Lloyds Banking Group) recording an overall level well above 50 at their peak. It is fairly straightforward to consider growth-through-leverage a typical European phenomenon, rather than an American one. There is also a lag-effect on leverage, the ratio of which increased even during 2008 and 2009 owing to the erosion of capital base following the losses experienced during the crisis. Many banks entered the crisis overleveraged. However, the massive deleveraging that began in 2009 concerned both subsamples to roughly the same extent, and at the end of 2011 the leverage ratio was at a minimum compared with the beginning of the decade. Its path during the decade is broadly consistent with the procyclicality of leverage detected by Adrian and Shin (2011). As we will see in greater detail ahead, one of the main causes of the reduction in leverage was the increase in capital requirements, one of the measures strongly supported by supervisory authorities after the collapse of Lehman Brothers in 2008.

Similarly, M&A activity within the financial sector was buoyant in the pre-crisis years (see Chart 2, right-handed panel). As the Group of Ten (2001) points out, the level of M&A started to increase during the 1990s, accelerating sharply towards the end of the decade. The level of cross-border M&A was limited, however. After a loss of momentum at the beginning of the 2000s, yearly M&A activity grew significantly between 2002 and 2006, with the total value of M&A operations in 2006 being almost four-fold the 2002 value. The contribution of this activity to the increase in size of the banks of the sample was certainly crucial, just as it had been crucial in increasing their concentration. Most of the banks of the sample undertook at least one major M&A operation in the period 2000-07. However, it should be noted that the buoyant M&A activity of the 2000s mainly involved European banks. North American banks experienced the most intense

⁵ In Europe, where IFRS are in use, balance sheets appear larger than in North America, where US GAAP are used. The main difference between these two accounting standards relates to derivatives: where the IFRS rule that long and short legs of derivatives positions must be included in financial statements, the US GAAP allow only the netting of the derivatives positions held to figure in financial statements.

phase of consolidation during the late 1990s, with a large growth in total assets. This explains why their total assets grew at a much slower pace than those of their European counterparts during the final decade. The eruption of the crisis in mid-2007 wiped-out most of the activity, which declined sharply in 2008 and 2009 before settling below €50 billion. Many operations finalized during the crisis years, rather than being driven by profitability, were fostered by efforts on the part of public authorities to bail-out severely weakened financial institutions.

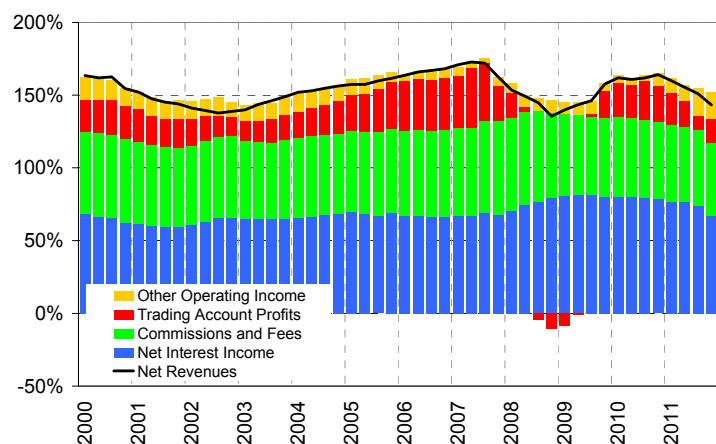
4. Diversification and Funding

The expansion of banks' balance sheets coincided with increasing diversification in banking activity and in the funding model. Traditionally, retail banking relied mainly on interest income, commonly considered the most stable source, whereas the typical investment banking source of income was trading activity and commissions and fees. However, boundaries between different activities became increasingly blurred during the period, with almost every bank in the sample involved in all types of banking and financial activity.

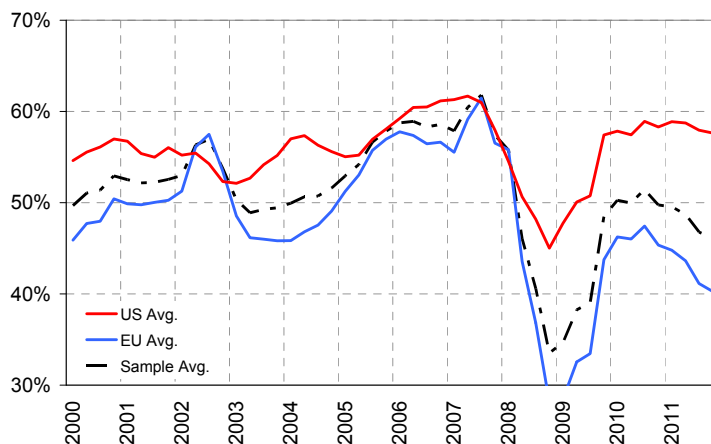
Chart 3, left-hand panel, shows the breakdown of average revenues by component for the whole sample. Revenues are shown as a percentage of operating costs (thus also giving a rough idea of the efficiency of banking activity during the 2000s). Interest income remained fairly stable around an average value of 65% of total operating costs until 2007 Q2. During the same period revenues from trading activity and commissions and fees steadily increased. The role of interest income grew enormously when the crisis broke out, peaking at a maximum level of 82% of operating costs in the first half of 2009, probably owing to central bank interventions in response to the crisis. At the same time income from trading activity, which increased rapidly until 2007 – from an average level of around 16% in 2002 to a peak of 41% in early 2007 – turned into loss for various quarters (e.g. -10% in 2008 Q4), recovering only from the third quarter of 2009 on and remaining well below the pre-crisis level. Commission and fee income decreased slightly, from 58% pre-crisis to 51%, mainly because of the slowdown in economic activity and the reduced financial activity requested by non-financial corporations. Interestingly, “other income” – usually a residual component – gradually increased its contribution from the end of 2010, peaking at 18% of operating costs at the end of 2011. This increase might be explained by extraordinary operations, undertaken mainly by European banks, to boost their capital base and fulfil the new and more binding capital requirements through the sale of non-strategic assets. Summing up, total revenues grew to 173% of operating costs in 2007 Q2, mainly thanks to non-interest-based income; they then decreased sharply to a low point of 136% in 2008 Q4 owing to the steep decline in the same

components. The recovery that followed broke off again in 2011 Q1, mainly because of the heightening of the sovereign debt crisis in the Eurozone, which led to a compression of margins in almost every income component.

Chart 3. Diversification of banking activity
Operating income breakdown **Share of non-interest revenues**



Source: Authors' calculations based on Bloomberg data
 Note: Ratio of Net Revenues (Total Income) to Total Operating Costs. Total Income is then broken down into Net Interest Income (blue area), Commissions and Fees (green), Trading and Account Profits (red) and Other Income (yellow). Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation).



Source: Authors' calculation based on Bloomberg data
 Note: The share of non-interest revenues is calculated as the ratio between the sum of trading profits and commissions and fees, and total revenues for each bank; mean values are then calculated with the single-bank share of non-interest revenues data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some values of the figures.

The share of non-interest income, usually from investment banking activity, in total revenues increased in the period under review (Chart 3, right-hand panel). The banks in the sample stepped up their operations in more volatile – and more profitable – non-interest based activities from 50% of total revenues to more than 60% on the brink of the crisis. Given the increase in non-interest income, the contribution of interest income to total revenues decreased slightly in terms of the other components, as noted by Davies et al. (2010) for the UK banking sector. As explained before, the sharp drop in non-interest revenues in 2007-09 does not indicate a decrease in these activities but in their contribution to total revenues owing to increased volatility in financial markets and a slowing of economic activity. Interestingly, the increase in non-interest revenues in 2000-07 had been sharper and more volatile for European banks, which originally gathered most of their revenues from interest-based activity. On the other hand, the sub-group of North American banks, more investment banking oriented, showed a higher share of revenues coming from non-interest activities throughout the decade. This share also remained more stable than for European banks. Moreover, after the crisis, North American banks recovered more quickly, with the 2010-11 share of non-interest income broadly in line with its pre-crisis level. European banks, faced

with the heightening of the sovereign debt crisis, were not able to recover completely to the pre-crisis level of non-interest income. On the contrary, their share of non-interest income dropped again from 2010, highlighting a growing difference with their North American counterparts.

Table 2. Sample breakdown by prevailing type of activity

Retail banks	Universal banks	Investment banks
HSBC	BNP Paribas	UBS AG
ING Groep	Deutsche Bank	Credit Suisse Group AG
Banco Santander	Barclays	Goldman Sachs
Wells Fargo	Royal Bank of Scotland	Morgan Stanley
Unicredit	Bank of America	Natixis
Commerzbank	Crédit Agricole SA	Bank of New York Mellon
Nordea Bank AB	JP Morgan	
Intesa San Paolo	Citigroup	
BBVA	Lloyds Banking Group	
Dexia	Société Générale	
	Royal Bank of Canada	

Source: Authors' calculations based on Bloomberg data

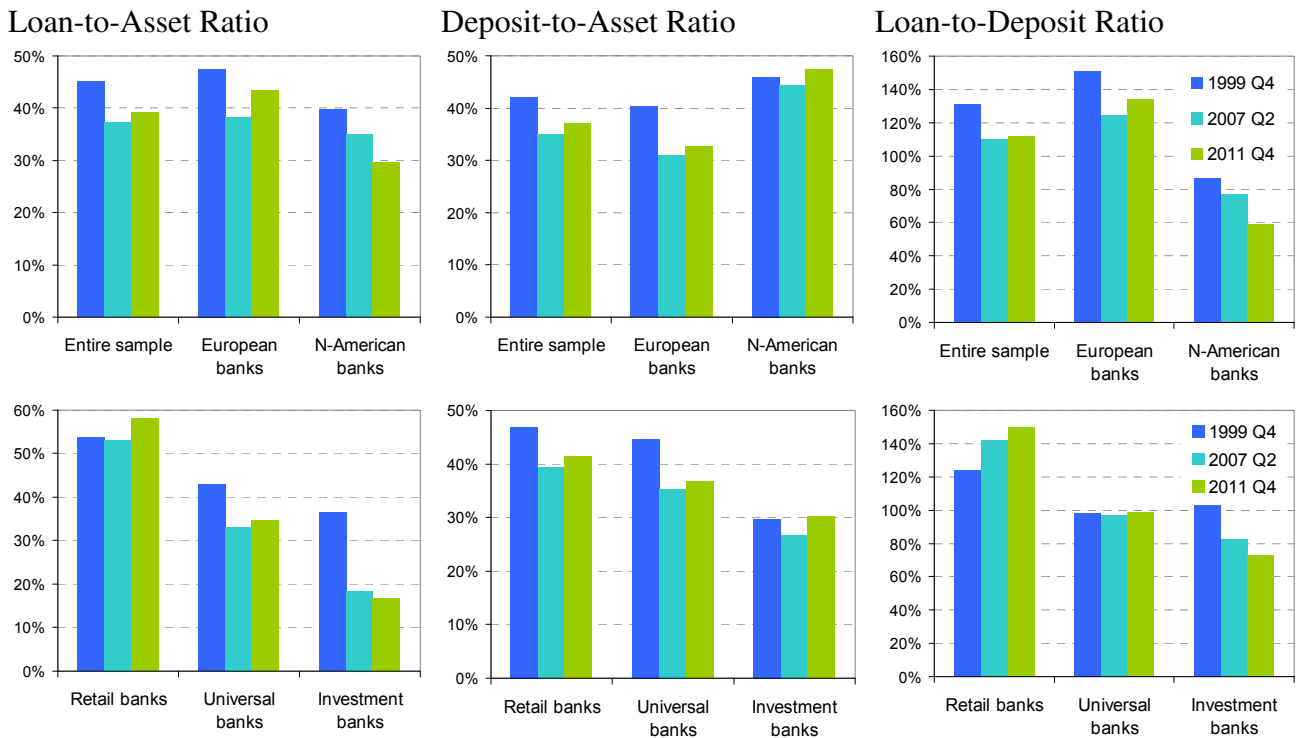
Note: The attribution to one of the three classes (retail, investment and universal banks) was calculated according to the following rule: retail banks have an average share of non-interest revenues below 40% of total revenues; investment banks have an average share of non-interest revenues beyond 60% of total revenues; while universal banks have an average share of non-interest revenues between 40% and 60% of total revenues. Average shares of non-interest revenues of total revenues are calculated over the whole time-sample in order to get rid of temporary effects on revenues as shown in left-hand side Chart 3.

The sample can be divided in three sub-groups by degree of income diversification: mainly retail banks (10 banks), mainly investment banks (6) and truly universal banks (11), as shown in Table 2. Retail banks still rely mainly on interest income, while for investment banks interest income plays a minor role, with the bulk coming from trading and commissions; finally, universal banks provide a high degree of diversification among the different sources of income (income breakdown at single bank level can be found in Annex 3). The increased diversification of activities can be ascribed to retail and universal banks. The primary objective was to catch up with the higher level of profitability of investment banks. However, this process led to an overall increase in those banks' riskier activities.

A significant difference between European and North American banking activities can be detected by analysing the Loan-to-Asset Ratio, LAR (Chart 4, upper left-hand panel). It shows that loans play a far greater role in Europe than in North America. The LAR decreased constantly throughout the decade for North American banks, standing below 30% at the end of 2011. European banks instead rely on loans for a larger part of their activities. Even if the ratio decreased somewhat from 1999 to 2007, it rose again to close to the level of the beginning of the decade, at 43%. This difference can be explained by the different structure of the American

financial market, where GSEs account for a major share of real-estate mortgages, securitization is more common, and – thanks to a deeper corporate bond market – corporations more frequently turn to market-based debt. Looking at the functional breakdown of the Loan-to-Asset Ratio in Table 2 (Chart 4, upper left-hand panel), it is clear that while retail banks mainly engage in traditional lending activity, with a LAR firmly above 50% and on the rise, investment banks place far less reliance on them, with their average LAR decreasing from 36% in 1999 to 17% in 2011.

Chart 4. Business model



Source: Authors' calculations based on Bloomberg data

Note: The three ratios are calculated for each bank, then averaged for every group. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation).

Diversification of activity has been funded in different ways, with different impacts on banks' business models. In the case of funding (Chart 4 upper centre panel), the Deposit-to-Asset Ratio (DAR) – which can be roughly considered the reverse of the wholesale funding ratio – shows that European banks relied (and still rely) on customer deposits as a source of funding less than North American banks. This difference, which was not extremely significant at the beginning of the decade (46% versus 40%), increased sharply, with the DAR decreasing to 33% for European banks, but rising to 47% for North American banks. This difference points to a strikingly different funding model, with European banks increasingly reliant on wholesale funding, which is traditionally more volatile. In agreement with common wisdom, the functional breakdown of the Deposit-to-Asset Ratio (Chart 4, lower centre panel) shows that retail banks can

rely on a higher deposit base than universal banks and a much higher one than investment banks. While the DAR decreased for all three subsamples from 1999 to 2007, during the higher risk-taking period, and increased again from 2007 to 2011, the differences between subsamples are less pronounced in 2011 than in previous years, highlighting an overall drop in the DAR for retail and universal banks and a slightly increasing DAR for investment banks. Thus, while retail banks maintain a safer funding model, after 2007 investment banks managed to reduce their exposure to more volatile wholesale funding.

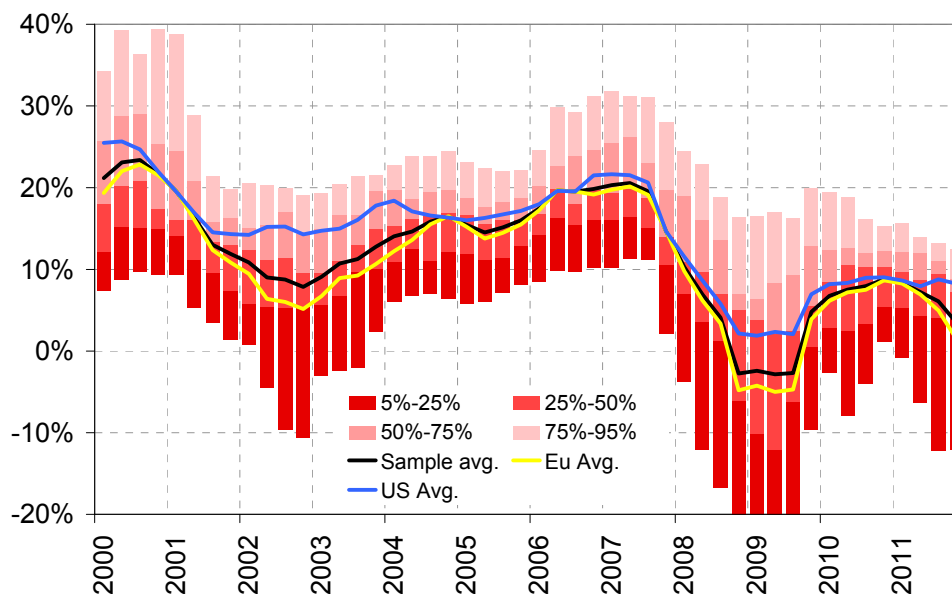
Combining LAR and DAR we have a clearer picture, together with the Loan-to-Deposit Ratio (LDR) shown in Chart 4, right-hand panel. This indicator is very important because wholesale funding is shorter-term and more volatile than customer deposits as a source of funding, and it is obviously more volatile than loans, which are usually long-term. Thus, a high LDR exposes a bank to a high maturity mismatch and then, ultimately, to a high funding risk. Given the stability of loans and deposits, the best business combination would yield an LDR below 100%. However, European banks have always had an LDR above 100% - as shown in Chart 4, upper right-hand panel. It stood at 134% for the subgroup at the end of 2011, and therefore European banks seem ill-positioned to withstand sudden reversals in the wholesale funding market. North American banks instead have constantly lowered their LDR during the last decade, to a minimum of 59% at the end of 2011, exhibiting a much safer business model from this perspective. Considering the functional breakdown (Chart 4, lower right-hand panel), the LDR is highest for retail banks, rising from 124% in 1999 to 150% in 2011; it is fairly stable at slightly below 100% for universal banks; and it is lowest for investment banks, decreasing from 103% in 1999 to 73% in 2011. These results lead to the apparently surprising conclusion that investment banks are in the safest position of the sample. However, it should be kept in mind that loans represent a very small part of investment banks' activity, as measured by the LAR, and so in this case the picture offered by the LDR might be less significant and even misleading. In fact, the DAR, which accounts only for funding choices, shows a greater reliance on wholesale funding by investment banks. Nevertheless, a comparison between data on retail and universal banks shows an increase in the overall riskiness of the former's business model throughout the last decade.

5. The Crisis

The years of great moderation rewarded the banking sector with a growing profitability. The main profitability indicator, ROE – calculated as the ratio between net income and total common equity – is shown in Chart 5. Profitability grew constantly for the whole sample from 2002 to

2007, even if North American banks had always outperformed their European competitors. However, the developing path of ROE for both subgroups is broadly similar. After a sharp decline in profitability in 2000-01, connected with the burst of the Dot-Com Bubble, ROE grew uninterruptedly from a low point in 2002 until it overshot 20% at the onset of the global financial crisis, though not returning to the record levels of the beginning of the decade. It then declined sharply in 2008/2009, rebounding only a little in 2010. During the pre-crisis years, ROE for North American banks had always been higher than 10%, whereas ROE for European banks, though reaching the same level of around 20% in 2006/2007, started from a far lower average level in 2002, around 5%. Thus, European banks recorded a greater surge in profitability in the few years preceding the crisis. Part of this increase in profitability was triggered by the greater diversification of banking activity (as in Elsas et al., 2010) highlighted in the previous paragraph. This diversification was often oriented towards more risky and profitable activities. Probably, as Ongena and Peydrò (2011) argue, during the low interest rate period (from 2002 to 2005) banks relaxed their standards and engaged in excessive risk-taking.

Chart 5. ROE, percentile range and mean values



Source: Authors' calculations based on Bloomberg data

Note: ROE is calculated as the ratio between net income and total common equity for each bank; mean values are then calculated with the single-bank ROE data. The percentile range distribution is also calculated on single-bank ROE data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some important values.

The excessive risk-taking and excessive growth of leverage, together with low risk premia and volatilities and surging asset prices, were signals of a growing vulnerability of the banking sector, in spite of the high level of profitability (Borio, 2010). Moreover, at the beginning of the

decade European banks – traditionally more retail-oriented – being less profitable than their North American counterparts may have tried to catch up by increasing the size of their balance sheets more rapidly through leverage and investment banking operations (as shown in the previous paragraph). Because these features were implemented too quickly, they may be at the root of the sharper decline in profitability experienced by European banks during the global financial crisis. ROE for European banks has also shown a far steeper decline during the crisis years, remaining negative on average for 4 quarters (2008 Q4 – 2009 Q3), while North American banks have managed to maintain positive profitability in every quarter.

The global financial crisis originated in the American housing market in the first half of 2007, with the collapse of the subprime mortgage market.⁶ The freeze on the interbank money market then caused the crisis to spread suddenly to the broader financial system through fire sales of toxic assets, collapsing values of almost any asset and huge losses that did not spare even the safest banks. The speed of transmission of the market tensions to the banking sector was favoured by the previously highlighted weaknesses embedded in banks' balance sheets.

As the distribution in Chart 5 shows, the crisis years were characterized by extreme heterogeneity, with some banks severely affected and accounting for a major part of the downward shift of ROE (Europe: UBS, Credit Suisse, RBS, Natixis; USA: Citigroup, Bank of America), while others managed to remain almost unscathed.

The huge losses that affected banks during the crisis years appeared – and can be measured – mainly through three channels, depending on their different nature:

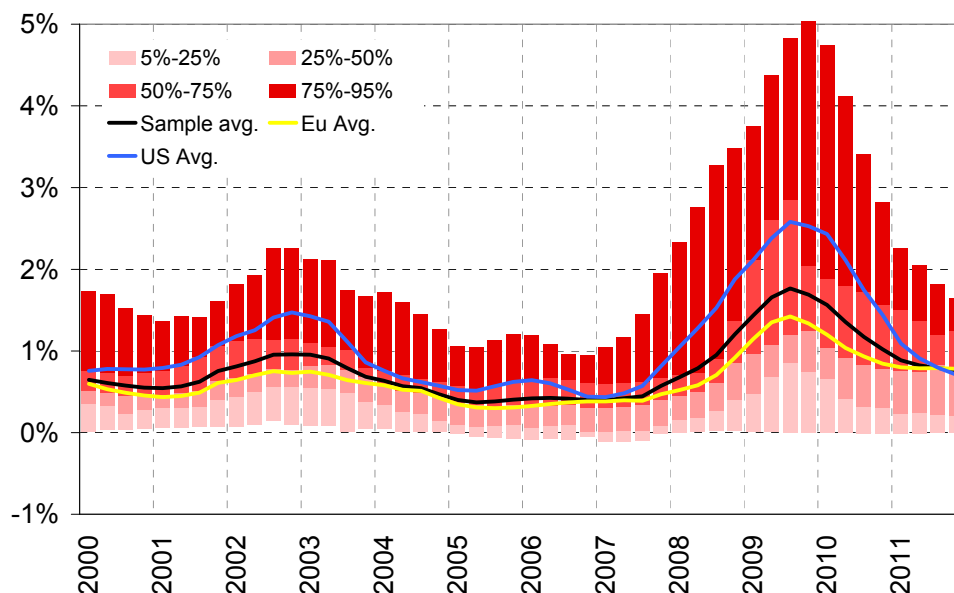
- Provisions for loan losses, which come from the most typical banking activity, deeply connected with interest income;
- Trading losses, which come from the riskier and highly volatile non-interest activities and are closely associated with the diversification of bank business during the boom years;
- Extraordinary losses, which encompass all the non-operating or exceptional losses.

Provisions for loan losses account for realized and potential losses on the loan portfolio arising during the reference quarter. As shown in Chart 6, the ratio of provisions for loan losses to total loans reached a maximum during the crisis, peaking at 1.8% in 2009 Q3, for the entire

⁶ For an historical perspective of the global financial crisis, see Bordo (2008).

sample.⁷ Despite having the same shape, the ratio for North American banks, standing at 2.6% at its peak, was considerably higher than for European banks, with a maximum value of 1.4%. This rapid rise began earlier than for European banks, was larger, and then also started to decrease more rapidly, while the ratio for European banks, after decreasing slightly, stabilized around 0.9% above its historical average. Interestingly, the ratio for North American banks, which traditionally has been higher than the one of their European counterparts, fell below it in 2011 Q4, for the first time since 2000. This overtaking might reflect the possible end of the downward cycle in the American real-estate market, while at the same time the weakness of the housing market in many European countries (Spain above all) is still harming the loan portfolio of several European banks.

Chart 6. Provisions for loan losses (to total loans), percentile range and mean values



Source: Authors' calculations based on Bloomberg data

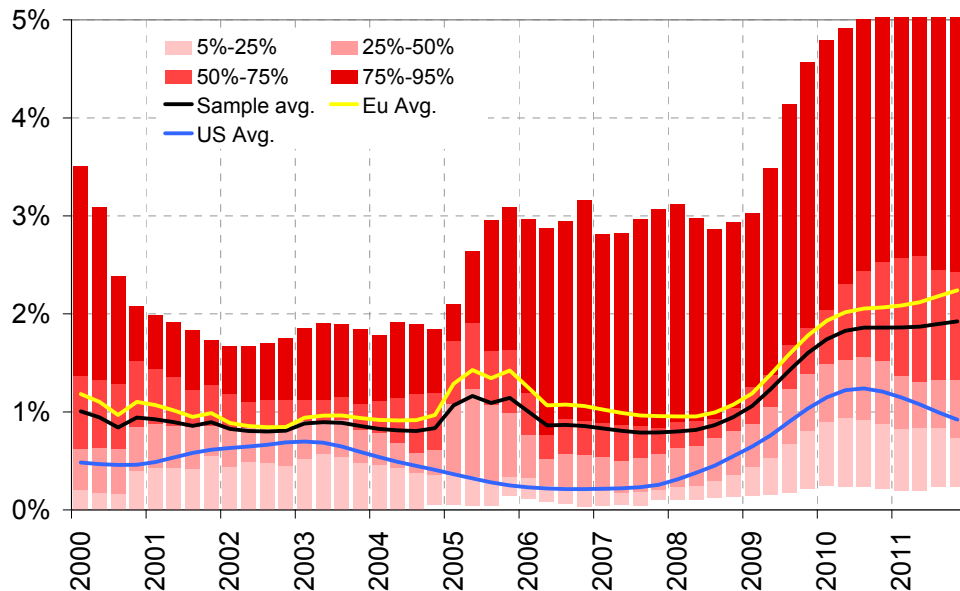
Note: Values are calculated as the ratio between provisions for loan losses and total loans for each bank; mean values are then calculated with the single-bank ratio data. The percentile range distribution is also calculated on single-bank ratio data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some important values.

This interpretation is supported by Chart 7, which shows the ratio of non-performing assets to total assets. The ratio for North American banks started to decline in 2010 Q4, while the ratio for European banks still showed a rising trend at the end of 2011, standing at its highest level by historical standards. Moreover, the high degree of dispersion of the percentile range accounts for the worryingly highly level of non-performing assets of many European banks. The speed with which American banks cleared their balance sheets of non-performing assets might reflect both the

⁷ Goldman Sachs and Morgan Stanley are not included in this ratio calculation as they do not collect provisions for loan losses.

end of the downward trend in the real-estate sector and greater efficiency, due to US law, in renegotiating contracts on non-performing assets.

Chart 7. Non-performing assets (to total assets), percentile range and mean values



Source: Authors' calculations based on Bloomberg data

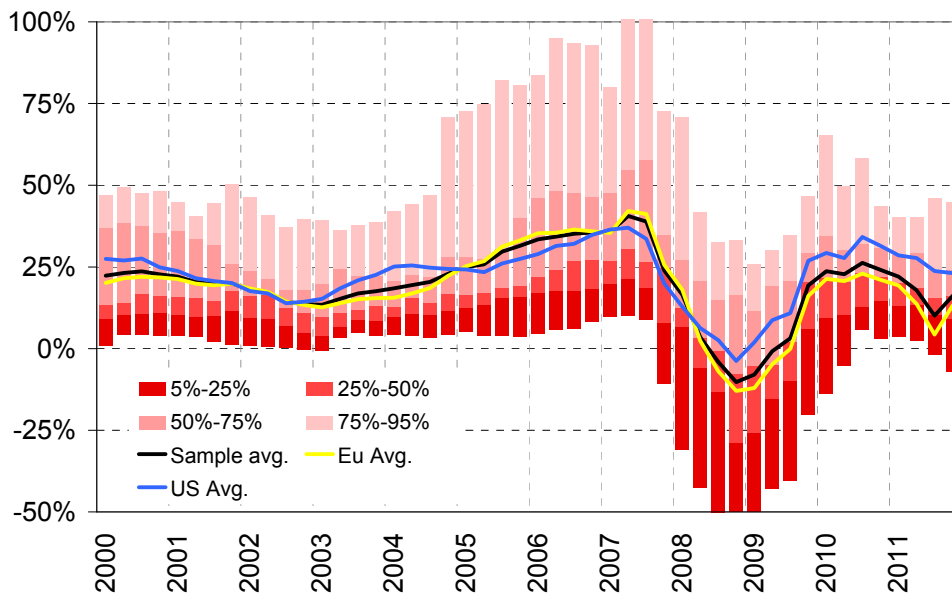
Note: Values are calculated as the ratio between non-performing assets to total assets for each bank; mean values are then calculated with the single-bank ratio data. The percentile range distribution is also calculated on single-bank ratio data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some important values of the figures.

Considering profits and losses from trading activity (Chart 8) we detect a very similar pattern to ROE (see Chart 5). After a moderate decline at the beginning of the decade, the average ratio between trading profits and operating costs rose steadily from 13% in 2002 to a maximum of 41% in 2007 Q1, only few months before the crisis erupted. Moreover, the percentile distribution showed a massive increase in heterogeneity, with some banks (like Goldman Sachs, Lloyds Banking Group, Crédit Agricole) seeing their trading profits exceed 100% of operating costs, while the most retail-oriented banks maintained only a moderate share of their revenues from trading activity. As retrospectively argued by several authors – Borio (2010), Brunnermeier (2008), Reinhart and Rogoff (2008a, 2008b) – the environment of low interest rates and volatility prevailing before the crisis favoured asset bubbles and excessive risk-taking via “search-for-yield” behaviour and the like.

From the last quarter of 2007, the turmoil on the financial markets started to affect trading activity severely with the average ratio declining sharply to a minimum of -10% in 2008 Q4. Notably, as the distribution shows, the heterogeneity between banks increased enormously during the most troubled quarters. In fact, while some banks managed to maintain a decent share of profits from their trading activity, others recorded losses in excess of 50% of operating costs. The

banks worst affected during the period (2007 Q4 - 2009 Q2) were of all kinds, from investment banks (UBS, Credit Suisse, Natixis, etc.) to universal banks (Citigroup, RBS, Deutsche Bank etc.), to mostly retail banks (Unicredit, Intesa San Paolo, ING, etc.). The banks that suffered the largest losses during the crisis still showed the lowest profitability of the banks in the sample during 2011 (above all, Citigroup and RBS). Moreover, some of the most heavily criticized mergers between troubled banks and supposedly healthy banks (e.g. Merrill Lynch with Bank of America, Bear Sterns with JP Morgan, HBOS with Lloyds Banking Group) were finalized as a result of the heavy trading losses of those turbulent quarters. The recovery that began in 2009 lost momentum at the end of 2010. However, the trading profits of North American banks stabilized at a level broadly in line with the pre-crisis level. The European banks, suffering from reversals in fixed-income trading activities connected with the sovereign debt crisis, suffered a decline in their trading profits in 2011 to level well below their North American competitors.

Chart 8. Trading profits (to operating costs), percentile range and mean values



Source: Authors' calculations based on Bloomberg data

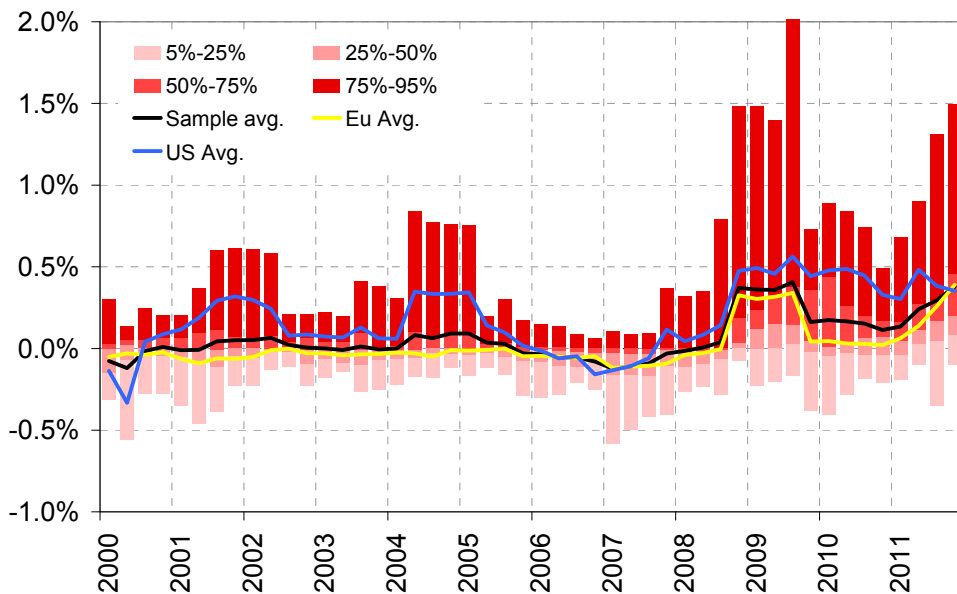
Note: Values are calculated as the ratio between trading profits to operating costs for each bank, then, mean values are calculated with the single-bank ratio data. The percentile range distribution is also calculated on single-bank ratio data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some important values of the figures.

The third channel, which groups losses emerging after the ordinary activity, consists of extraordinary items arising from securitization activity, write-downs of assets, various types of impairments (e.g. goodwill impairments), abnormal losses (according to the ISO95 definition), restructuring charges, spin-off/sell-off expenses, and so on.⁸ Chart 9 shows the ratio between the

⁸ As can be seen from Chart 9, these items may eventually account for extraordinary gains.

sum of all these extraordinary losses and total assets. Although the mean of the distribution does not show any particular spike, the percentiles show a tremendous increase in extraordinary losses from 2008 Q4. After declining in 2010 the ratio of extraordinary losses to total assets started to climb again in 2011, mainly as a consequence of the goodwill impairments and write-downs of sovereign bond holdings by European banks in connection with the sovereign debt crisis. It is interesting to note that from 2008 the bulk of these losses has come from North American banks. However, in accordance with the previous two indicators (provisions for loan losses and trading profits), European banks suffered increasingly heavy losses during 2011.

Chart 9. Extraordinary losses (to total assets), percentile range and mean values



Source: Authors' calculations based on Bloomberg data

Note: Values are calculated as the ratio between extraordinary items to total assets for each bank, then, mean values are calculated with the single-bank ratio data. The percentile range distribution is also calculated on single-bank ratio data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some important values of the figures.

In the end, the recovery of banking profitability after the crisis (see Chart 5) has been weak and sluggish owing to unresolved balance-sheet fragilities (in particular the need for deleveraging and elimination of toxic assets, scaling back the most risky activities, weak economic growth). The average ROE for North American banks stabilized below historical levels at just under 10%.⁹ However, European banks, having been severely affected by the sovereign debt crisis, recorded declining profitability from the beginning of 2011, with any positive profitability almost wiped out at the end of the year. The main causes of this sharp decline are to be found in the market tensions connected with the sovereign debt crisis, the higher costs of wholesale funding and the write-downs for reduced value of Eurozone sovereign bond holdings. Notably, the write-downs on

⁹ Even though some banks, like Bank of America, are still struggling to earn a positive stream of income.

Greek sovereign bond holdings led Dexia to de facto bankruptcy between 2011 Q3 and Q4 and to the projected split of its activities. While the global financial crisis affected first American banks and then expanded worldwide, the sovereign debt crisis looks mainly a European affair. The increased dispersion at the end of 2011 is chiefly due to the steep drop in profitability for Italian and French banks and Dexia. Given the gloomy forecasts for economic growth in Europe (especially in Southern European countries), the still unresolved sovereign debt crisis – with its negative effect on bank funding conditions (CGFS, 2011) – and the deleveraging still under way, prospects for European banks' profitability appear grim.

6. The Response to the Crisis: Return to Traditional Banking?

The disruption caused by the global financial crisis has been so deep and so widespread as to change the banking industry landscape completely, besides reducing profitability. Some changes can be interpreted as an endogenous response by the banking sector to a more challenging and risky financial environment, while others are driven by the effort of regulatory authorities to plug the gaps that emerged during the crisis. The main shifts can be identified in three areas: capital ratios, liquidity, and non-interest banking activity.

The main lasting legacy of the global financial crisis, which is meant to be one of the main bulwarks against the advent of a new crisis, is higher capital ratios. In fact, most of the banks in the sample entered the crisis undercapitalized and overleveraged (to say nothing of the weaker banks that went underwater during the crisis). Moreover, as Panetta et al. (2009b) clearly point out, several governments needed to provide capital injections of unprecedented magnitude to strengthen capital bases. Thus, the bulk of regulatory efforts concentrated on improving the capital requirements for banks through an increase in the quantity of capital and its quality. The backbone of the new global regulatory framework – commonly known as Basel III¹⁰ – deals with the improvement of banking capital bases.

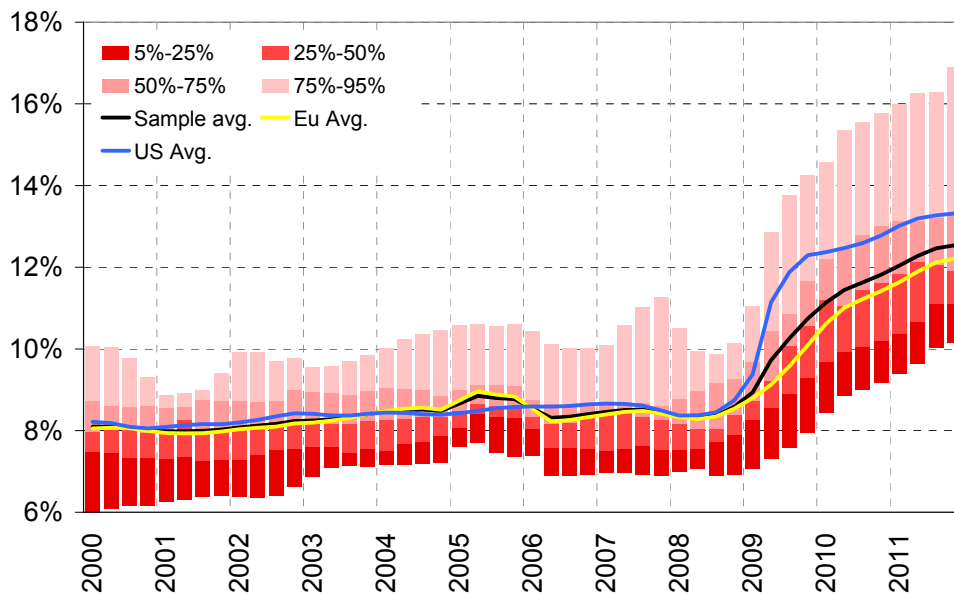
This effort can be seen clearly from Chart 10, which plots the average and distribution of the tier 1 capital ratio. Since 2008 this has increased by about 50%, breaching an average of 12%. Moreover, some national regulatory authorities are asking for even higher capital requirements (e.g. Switzerland and the UK, whose banks have higher capital ratios, averaging 14%). The North American average is still higher because this subgroup includes a greater share of investment banks, which have stronger capital positions. The ten less capitalized banks in the sample at the

¹⁰ For further details on the rationale and features of the new capital regulation, see “Basel III: A global regulatory framework for more resilient banks and banking systems”, BCBS – June 2011.

end of 2011 are all from Eurozone countries. However, they are expected to improve their capital positions, partly as a result of the EBA recommendation on capital requirements.¹¹ These improvements in capital bases were the main driver of deleveraging, together with a sudden halt in asset growth, as briefly shown in Section 3.

A possible implication is that the tighter regulation and the increase in capital positions – often reached through sales of risky assets – could provide scope for an enhanced role of the shadow banking system. Moreover, as in Adrian and Shin (2010b), the protracted deleveraging could further depress asset prices, with negative second-round spill-overs to banks’ balance sheets and the risk of a major contraction in lending or even a credit crunch.

Chart 10. Tier1 capital ratio



Source: Authors’ calculations based on Bloomberg data

Note: Mean values and the percentile range distribution are calculated aggregating Tier 1 Capital Ratios data for each bank. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation).

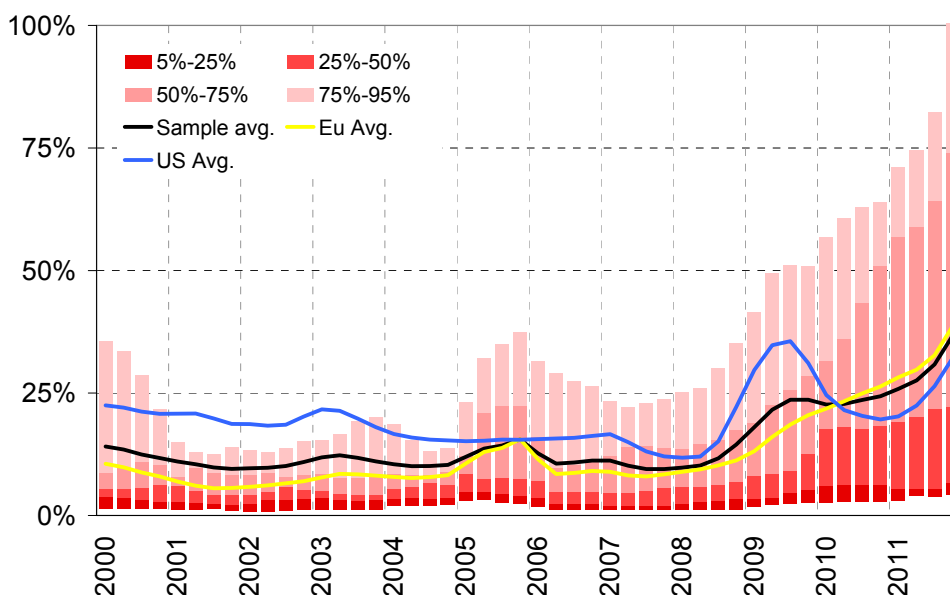
The second major feature pertains to liquidity. On the eve of the crisis, central banks responded to the freeze of the interbank market by pushing short-term interest rates to their zero bound. Then they resorted to massive liquidity injections to counter the drying up of banking liquidity and supplant banks’ deleveraging (Adrian and Shin, 2010a).

The flooding of the financial system with liquidity has been tied to the massive surge of spare liquidity holdings on banks’ balance sheets. Chart 11 shows the liquidity ratio – calculated as the ratio of cash and near-cash items to short-term borrowings. This ratio, which was fairly stable between 2000 and 2008 for European banks and showed a downward trend for their

¹¹ For further details on the recommendation see “EBA Recommendation on the creation and supervisory oversight of temporary capital buffers to restore market confidence”, EBA/REC/2011/1.

American counterparts,¹² started to increase in 2008 Q3 – notably the quarter in which Lehman Brothers collapsed – reaching the all-time high of 30% at the end of the series. This upward trend in the liquidity ratio can be explained mainly by demand factors. The breakdown in the interbank money market and the higher levels of volatility and risk aversion experienced in financial markets from 2007 may have prompted banks to hoard more liquidity than ever. The massive provision of cheap liquidity to the banking system by monetary authorities allowed banks to quickly substitute inter-bank funding with official funding. Interestingly, the hump in the average for the North American sub-sample coincided with the maximum amount of liquidity provided by the Federal Reserve, while the upward trending path in the European sub-sample is consistent with the increase in liquidity provision by the ECB.

Chart 11. Liquidity ratio



Source: Authors' calculations based on Bloomberg data

Note: Values are calculated as the ratio between cash and near-cash items to short term borrowing for each bank, then, mean values are calculated with the single-bank ratio data. The percentile range distribution is also calculated on single-bank ratio data. Quarterly data (annualized via the trailing sum of the last 4 quarters for every observation). To enhance the insight of the graph, the scale of the y-axis has been restricted, even if it cuts off some important values of the figures.

The sample is deeply heterogeneous, however: most French, Italian and Spanish banks maintained a liquidity ratio broadly in line with the pre-crisis level, while some other banks (like the British and Swiss banks) accounted for most of the increase in the average liquidity ratio. Another cause for this surge in the liquidity ratio was regulatory changes. While the tougher stance taken by the Swiss and British authorities in upgrading supervisory requirements may be at the root of the impressive increase in the liquidity ratio for their banks, it should not be forgotten

¹² The higher average level for North American banks, during the pre-crisis years, is caused by the high values reported by Bank of New York Mellon, which always held large amount of free liquidity.

that the Basel III accord provide for a new liquidity coverage ratio (LCR) and a net stable funding ratio (NSFR) to be introduced.¹³ Although this new liquidity monitoring framework will come into force only from 2015 onwards, some banks could already be adapting their balance-sheet structures to the new standards.

The third major aspect is related to non-interest banking business, encompassing all the riskier and more profitable activities that caused huge losses during the crisis, as shown in Section 5. While several measures have been introduced within the Basel framework (e.g. increasing the risk weights of several types of securities holdings), the paradigm has not changed and the universal banking model is not under revision. Nevertheless, some jurisdictions are evaluating harsher measures, which would definitely alter the future banking landscape. In the US, the much disputed “Volcker Rule” is currently under scrutiny and could come into effect by 2013. It proposes a ban on proprietary trading by banks that take retail deposits and prevents them from owning hedge funds. Moreover, in the UK, the Independent Commission on Banking (ICB)¹⁴ published its final report in late 2011, proposing the ring-fencing of retail banking operations of UK banks from their riskier investment banking operations and a further strengthening of capital bases by 2019. In the same light, Blundell-Wignall et al. (2009) and the OECD (2009) proposed the legal separation between investment and retail banking activities through the creation of a non-operating holding company (NOHC) that would invest, as a parent, in its operating affiliates.

These measures aim to preserve financial stability by separating retail banking from riskier activities, thus going in the opposite direction to the deregulation of the banking sector that took place from the 1990s. In the words of De Grauwe (2009), these measures would signal the end of the universal banking model and the return to some kind of narrower banking (because the activities bank can engage in are narrowly defined). However, to make these measures fully effective – and to order the end of universal banking – they should be adopted globally. Instead, the new Basel III framework does not ban banks from engaging in investment banking activities, even if it provides a set of new, tighter rules designed to make exposure to many risks less profitable. Given the potential for financial innovation and regulatory arbitrage, this might allow banks to continue their business as usual.

¹³ For further details of the rationale and features of these ratios, see “Basel III: International framework for liquidity risk measurement, standards and monitoring”, BIS, BCBS – December 2010.

¹⁴ The ICB was created in 2010 by the UK Chancellor of the Exchequer to evaluate possible reforms to the UK banking sector designed to promote financial stability and competition, and to make recommendations to the Government.

7. Concluding Remarks

This note analyses the main changes that the largest banks have undergone since the late 1990s through the examination of their balance sheets. Fostered by banking sector deregulation and buoyant financial innovation, these changes were massive, both in the run-up to the global financial crisis that began in 2007 and in its aftermath. Especially in the boom years, they entailed the rise of the universal bank model. Until 2007, banks showed ever-increasing profitability, largely due to investment banking activities. The changes were most marked in the case of the European banks in the sample, which were traditionally more retail-oriented.

This growing profitability obscured many weaknesses of the banking system, which only became self-evident with the eruption of the crisis. Banks were overleveraged and, encouraged by a low-interest and low-volatility environment, embarked on excessive risk-taking.

The eruption of the crisis in 2007 triggered a sharp reversal of all the major indicators. Huge losses in trading and lending portfolios and write-downs of asset holdings caused a sharp drop in profitability, which fell to the lowest point of the decade in 2008-2009. The recovery observed in financial markets from the second quarter of 2009 provided only partial relief.

In fact, with banks committed to a painful deleveraging (through the strengthening of the capital base or the shedding of assets), profitability stabilized below its pre-crisis level. European banks had been slower in adapting to the new financial and regulatory landscape. Given the grim economic performance of the European economy and the tensions connected with the sovereign debt crisis in the Eurozone, European banks suffered new trading losses and a share of non-performing assets still on the rise. Not surprisingly, profitability again narrowed sharply. Considering the higher reliance of European banks on wholesale funding, they are much more vulnerable to a reversal of confidence than their North American counterparts.

The health and the prospects of the banking sector as a whole appear grim. Banks are still heavily reliant on emergency liquidity provisions offered by central banks, and confidence in the interbank market – as shown by the liquidity ratio – has not been restored. Moreover, regulatory efforts, at both supranational and national level, aim to improve banks' resilience through tougher capital requirements and a new set of rules on liquidity and leverage. Although many improvements are under way, increasing capital position and profitability at the same time is proving to be a considerable challenge, especially for banks in the Eurozone. Having to make this effort at a time of weak economic recovery and still higher-than-normal risk aversion adds to the difficulty of succeeding.

What might be hard to sustain in the future is the universal banking business model as such. A safer banking sector might not be consistent with pre-crisis profitability levels. Policy choices currently debated in the US and UK could definitely lead the way to a safer banking model, based on traditional deposit-taking and lending activities and separated from investment banking. But the pace of financial innovation, the growing role of the shadow banking system, and the deep interconnectedness between financial institutions suggest that the path to some kind of more traditional banking might also be strewn with obstacles.

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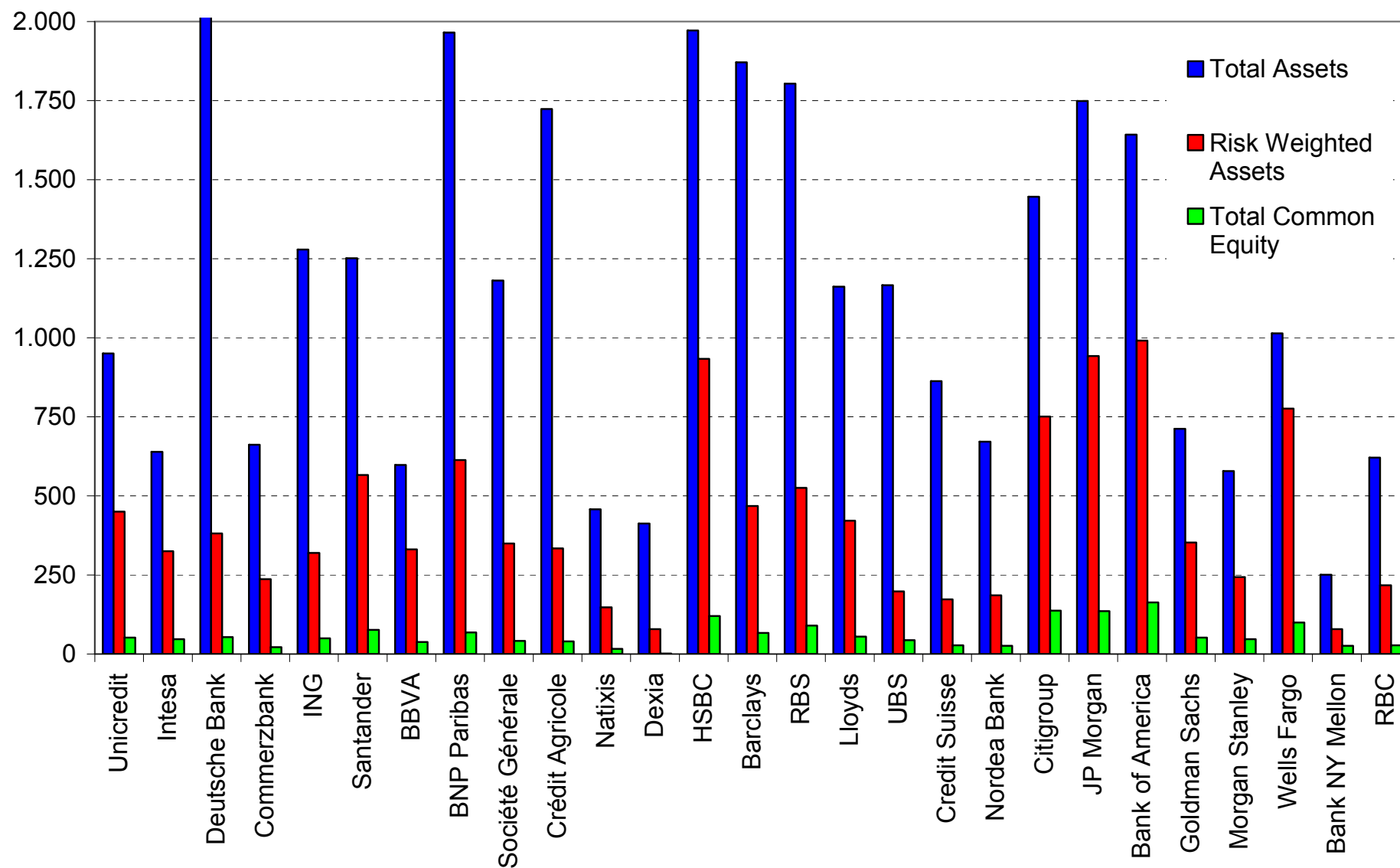
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ANNEX 1

Major international banks: total assets, risk-weighted assets and total common equity at the end of 2011 ⁽¹⁾



Source: Authors' calculations based on Bloomberg and Datastream Data.

(1) Where not available, data from the preceding quarter are used.

ANNEX 2

The Database

The data

The balance- sheet data shown in Charts 2 to 12 are taken from Bloomberg.

The time horizon is 1999 Q1 : 2011 Q4.

Balance-sheet data are observed at *quarterly* frequency; however, the reference period of every datum is *yearly* (with every change to the preceding datum to be regarded as the yoy variation). Quarterly flow data are presented on a yearly basis calculating the trailing sum of the data for the last four quarters. Quarterly data on stocks are averaged through the last four quarters.

All the indicators are built as ratios of two different balance-sheet items. They are independent of the reference currency and are not affected by different orders of magnitude. In any quarter, indicators show the ratio between two annualized balance-sheet items.

Estimation procedure of quarterly data

Quarterly data for banks providing only semi-annual data (BNP Paribas, Société Générale, Crédit Agricole, Natixis, HSBC, Barclays, Royal Bank of Scotland and Lloyds Banking Group) are estimated.

Quarterly data on stocks are calculated under the assumption of a constant accumulation through time.

Quarterly data on flows are estimated on the basis of an autoregressive procedure. For each variable, quarterly data (Q) from the rest of the sample (19 banks) were collected. Given that

$$(1) \quad S_t^i = Q_t^i + Q_{t-1}^i$$

where S_t^i is the semi-annual datum, we built a semi-annual data series for this sub-group of banks, with semesters ending at the second and fourth quarter of the year. We then ran a linear regression – for the first and third quarter of every year of the sample – on the following equation:

$$(2) \quad Q_{t-1}^i = \alpha_0 S_t^i + \alpha_1 S_{t-2}^i + \alpha_2 S_{t-4}^i$$

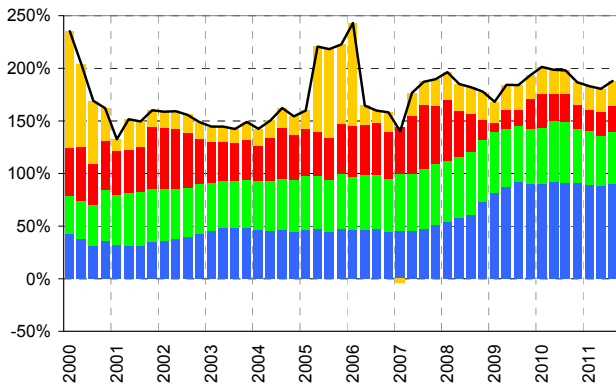
The constant parameter was forced to zero. Usually, the R-squared coefficient was above 90% for every quarter considered and every variable. Applying the estimated parameters – $\hat{\alpha}_i$ of equation (2) – to the semi-annual data, we managed to estimate \hat{Q}_{i-1}^i for every variable and every bank providing only semi-annual data. With equation (1), we completed our quarterly data estimation. With specification (2) we connected every quarterly result to the fluctuation in the same variable through time in the rest of the sample (where quarterly data were available), provided that rest-of-the-sample results are the best predictors of intra-semester results for the banks with only semi-annual data.

ANNEX 3

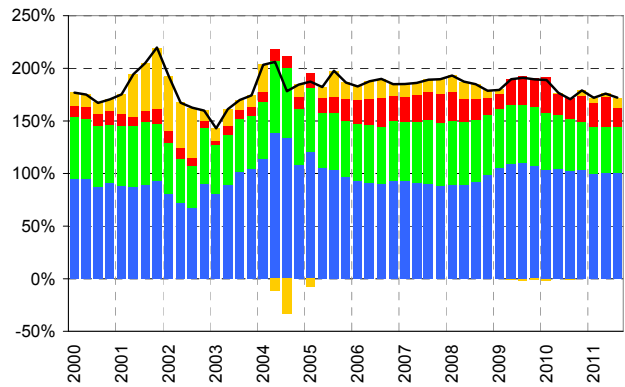
Operating income breakdown

Net Revenues (Total Income) to Total Operating Costs Ratio. Total Income is then broken down into Net Interest Income (blue area), Commissions and Fees (Green), Trading and Account Profits (Red) and Other Income (Yellow). Quarterly data (annualized via the trailing sum of the preceding 4 quarters). Banks are shown in the same order as in Table 1.

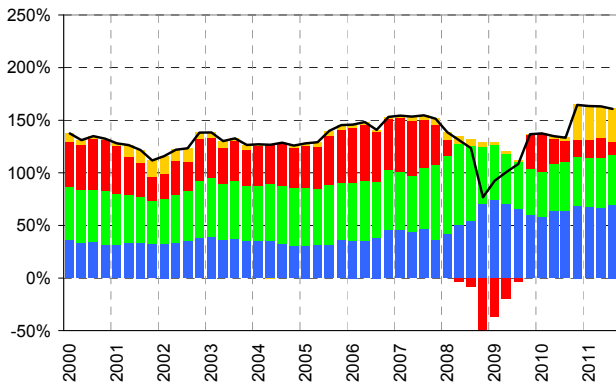
BNP Paribas



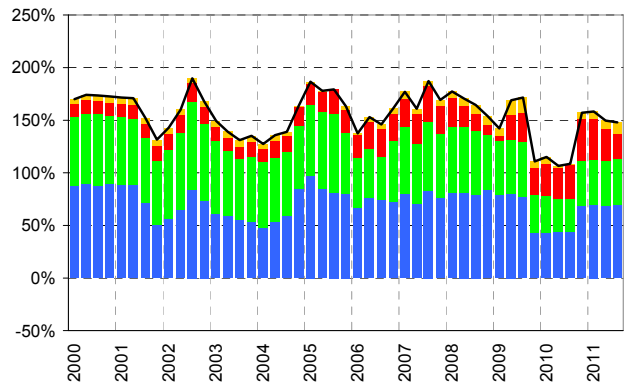
HSBC



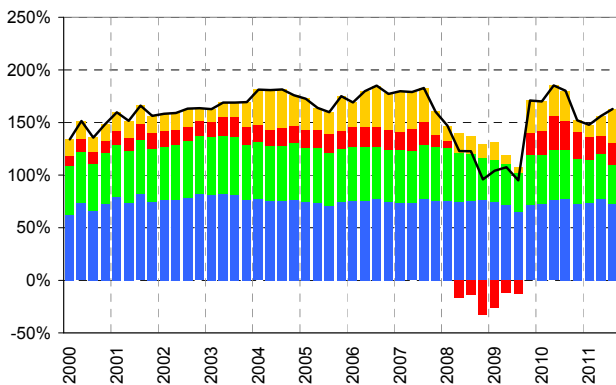
Deutsche Bank



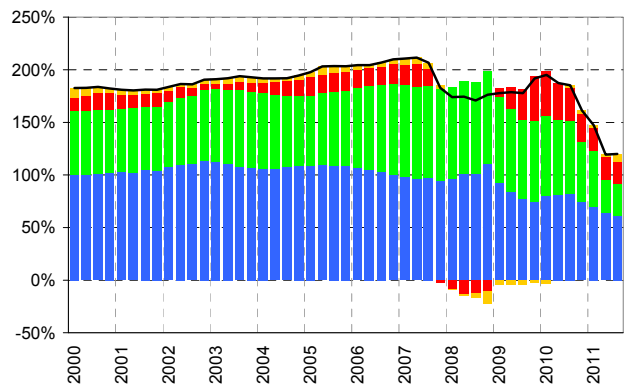
Barclays



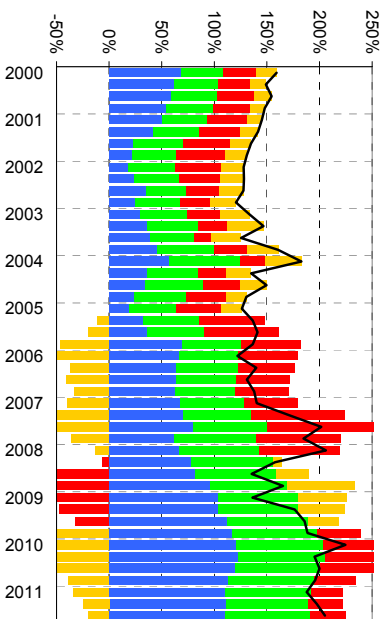
Royal Bank of Scotland



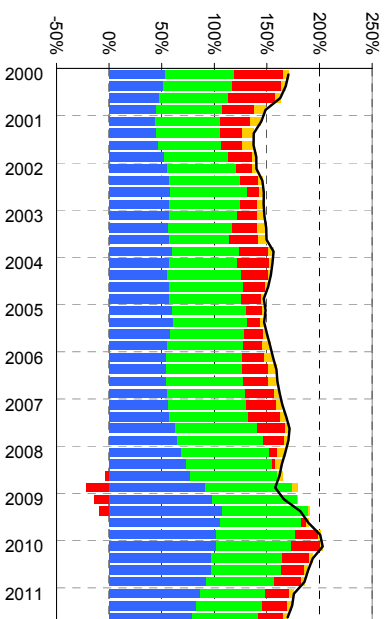
Bank of America



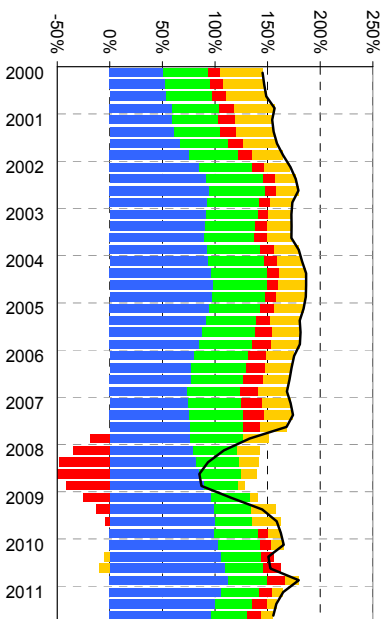
Crédit Agricole Sa



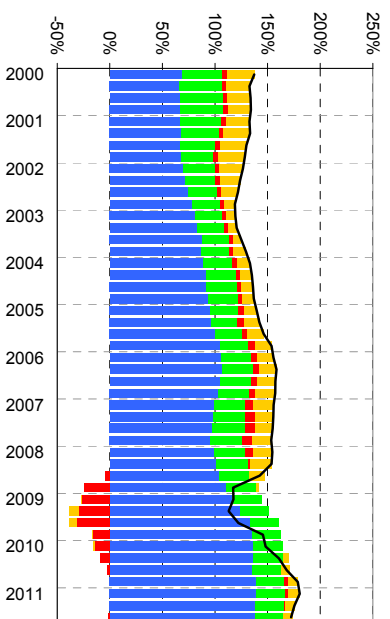
JP Morgan



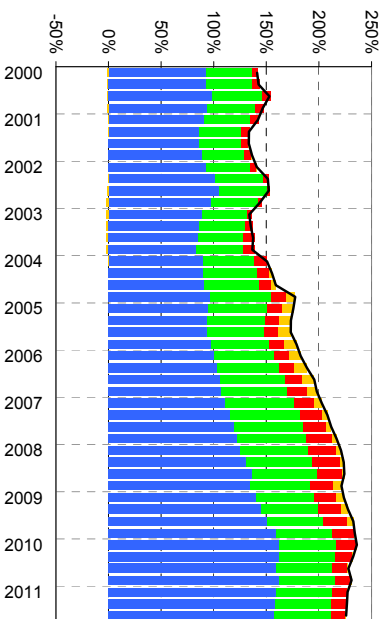
Citigroup



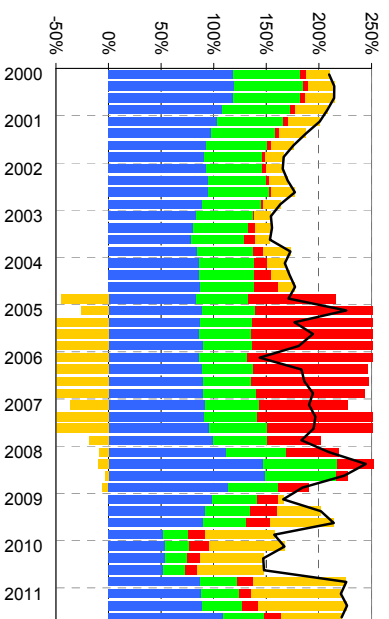
ING Groep



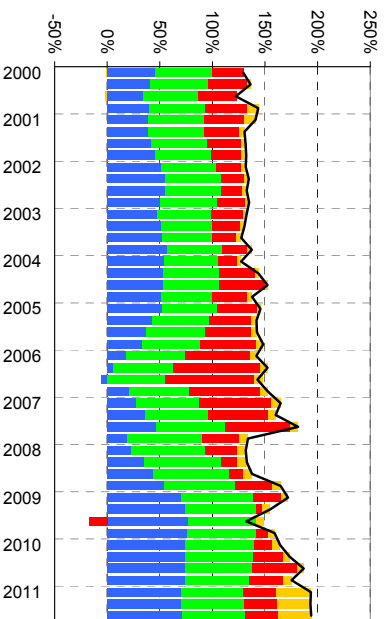
Banco Santander



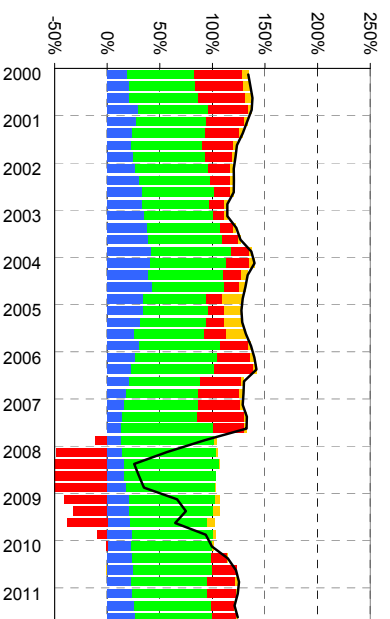
Lloyds Banking Group

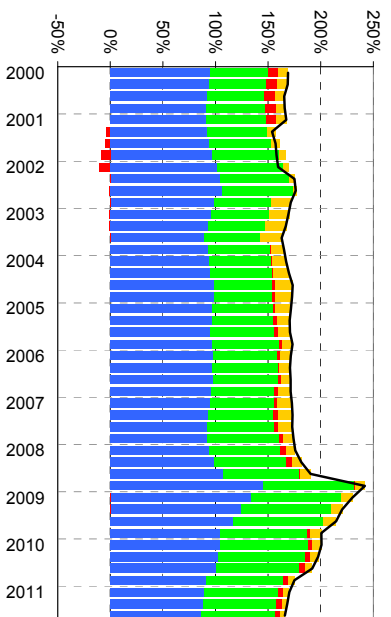


Société Générale

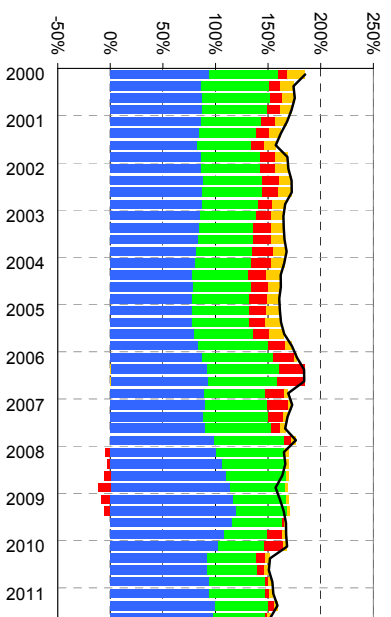


UBS AG

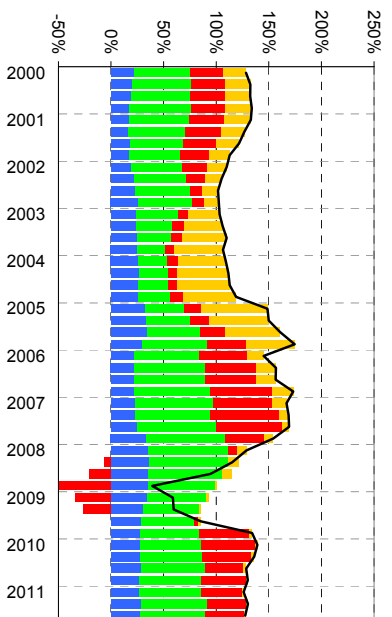




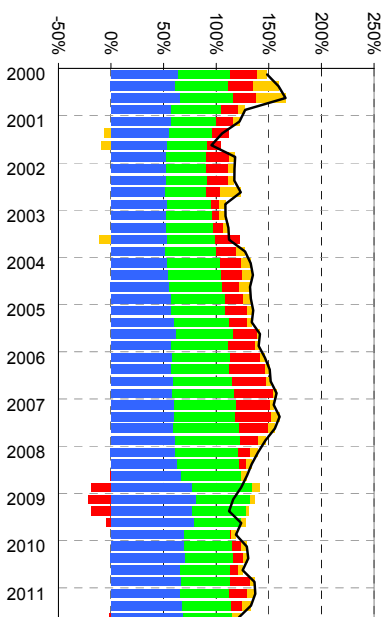
Wells Fargo



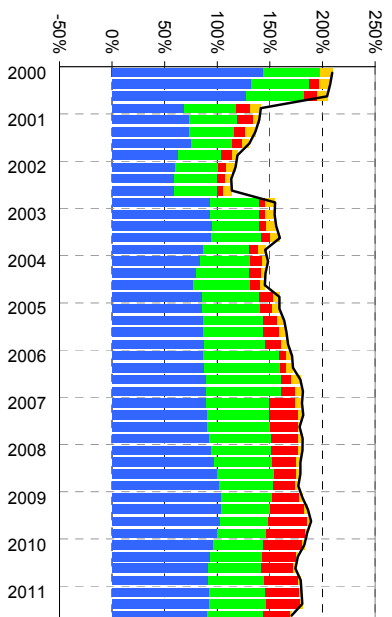
Unicredit



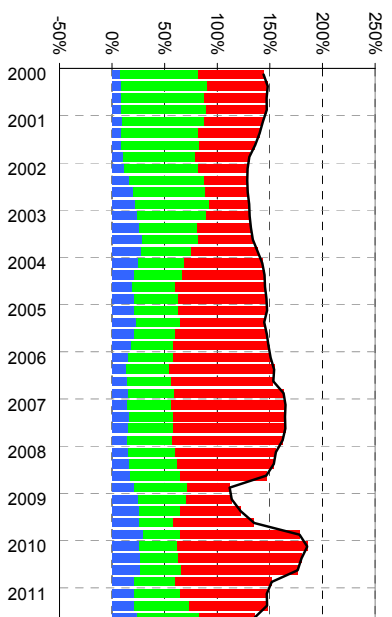
Nordea Bank AB



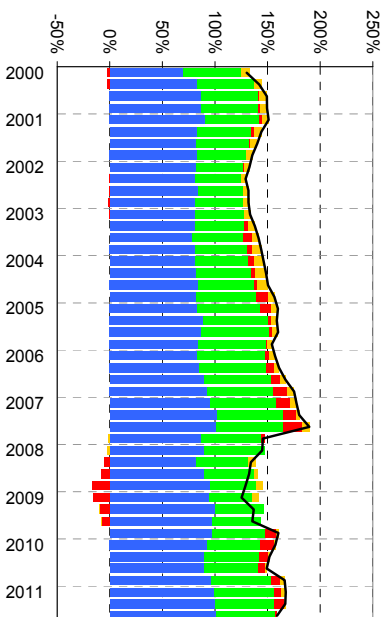
Goldman Sachs



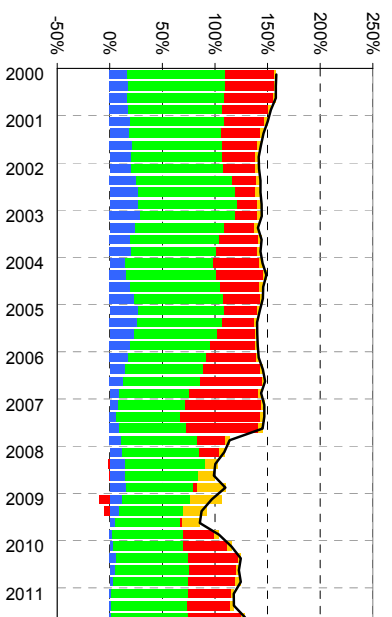
Intesa San Paolo



Morgan Stanley

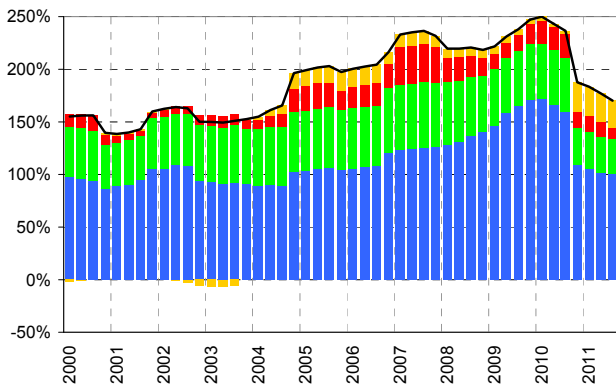


Credit Suisse Group AG

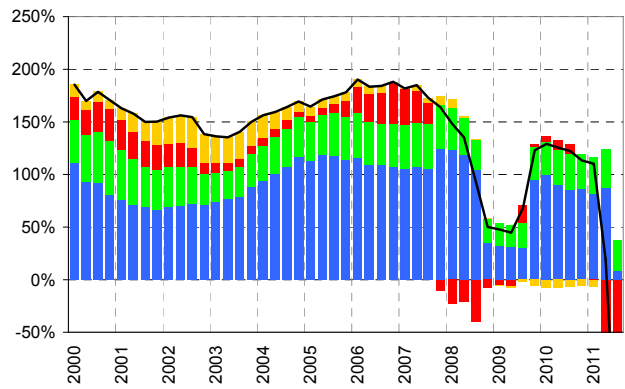


Commerzbank

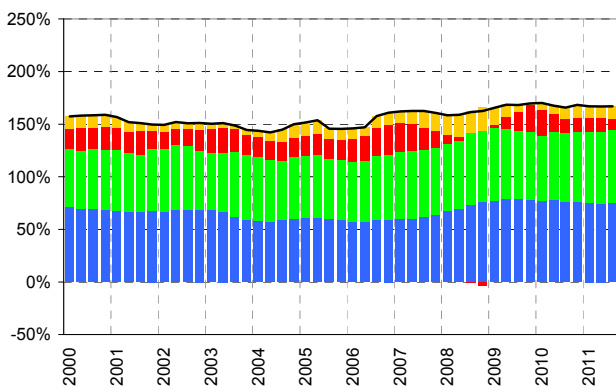
BBVA



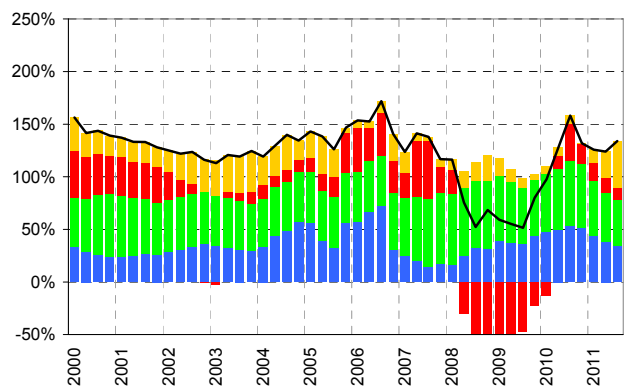
Dexia



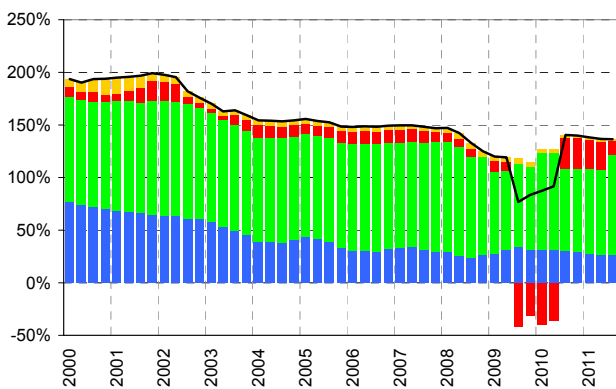
Royal Bank of Canada



Natixis



Bank of New York Mellon



Source: Authors' calculations based on Bloomberg data