The Banking Sector and Recovery in the EU Economy

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Abstract

Abstract Banks within Europe have become larger and more international. We use a micro data set to investigate the impact of size on banks Net Interest Margin and show larger banks lower borrowing costs for firms which raises sustainable output. We use NiGEM to look at the impact of banks becoming smaller and moving back into their home territory. We first investigate the impacts on output in large and small countries showing that the effects are generally larger in small countries, and also larger in economies that are more dependent on bank finance for their business investment decisions. If recent increases in sovereign spreads propagate into the banking system they will cause a sharp slow down in activity in Greece, Spain and Portugal and also in Ireland and Italy.

Introduction

The financial crisis of the last three years has seen a dramatic change in the EU Financial sector. Since the early 1990s, with the completion of the internal market there had been a growing move towards an EU financial services market. Banks were becoming more international with greater regional coverage within the EU (and the world). It was anticipated that this integration of the European financial sector would result in a more efficient use of capital in the EU economy. It would also lead to increased competition. In turn, this was expected to lead to a lower cost of capital, higher investment and, eventually, higher growth. The benefits were expected to arise from both efficiency gains within the sector and also from a more efficient allocation of capital across the economy.

Since the 1980s changes were also taking place in the US. With the ending of Glass Stiegel the development of US as opposed to state banks was facilitated. As a result of the savings and loan crisis of the 1980s there was a concern in the US that banks, which were confined to single states, were more at risk from idiosyncratic shocks affecting individual states. For example, the Fed in Kansas City saw a major collapse in the banking system in its district (Kansas – Wyoming) because of shocks affecting the local economy. This resulted in major insolvencies. The response was to encourage securitisation but also to encourage geographical diversification in the banking system – bigger more national banks. This prudential concern for geographical diversification seems to have been less of an issue within the EU in the move towards financial integration.

The current financial crisis has seen the collapse of some banks within the EU and many more banks have been either partly or fully nationalised because of their inability to deal with their losses. Because of the national basis of banking regulation within the EU it has fallen to individual member governments to rescue "their own" banks.

- Thus in the UK the UK government has had to invest major funds in rescuing Northern Rock and, more importantly, RBS and HBOS. While the problems in RBS arose from a botched takeover of a Dutch bank, ABN Amro, it was the UK government where the banking group was headquartered, not the Dutch government, that had to foot the bill.
- In the case of Fortis bank responsibility was shared by the Belgian and Dutch governments with the bank being broken up on national lines.
- In the case of the Irish banking system the government had to nationalise the biggest three national banks and take major stakes in others.
- In Spain the government has had to rescue the Caja banks.
- In Germany the government had to rescue Hypo.

Thus the EU banking system has seen a major involvement by national governments in capitalising and owning banks headquartered on their territory. To allow the banks expand and prosper in the future they will need more capital. If the markets fail to provide the capital either governments will have to come up with it or the banks will be zombies, having to survive by gradually reducing the size of their balance sheet.

A big question facing many governments and the EU Commission is whether governments will just recapitalise banks so that they can lend in their own territories or whether they will recapitalise them so that they can operate across their geographical footprint. For example, after the January 2009 EU Finance Council the UK Chancellor of the Exchequer announced that, while the UK government was recapitalising RBS, he was not sure whether they would recapitalise their subsidiary on the island of Ireland – Ulster Bank. It seems as if, in the end, they decided to keep Ulster as Ulster has had an injection of €3bn with a further €3bn to come to keep them in business. Also the Danish government, which has supported Dansk bank, appear to have decided not to recapitalise their subsidiary on the island of Ireland – Northern. The Irish government is requiring AIB to sell off their UK, Polish and US interests to provide some of the capital needed to allow them operate normally (giving loans) in Ireland.

This paper addresses these issues in a systematic way. We first look at the changing structure of the European banking system, describing the ownership structure in 2009 and the changing pattern of cross border activity. This peaked in 2007 and in most countries it has subsequently declined. This decline is associated with the trend to re-territorialising banks discussed above, and it will reduce the average scale on banks in many economies, and especially in the smaller economies. Smaller banks generally charge more for their loans, and hence the user cost of capital is higher in countries with small banks and in small countries if banks operate only within the domestic territory. We therefore review the literature on bank net interest margins and undertake an empirical analysis of the impact of bank size on the net interest margin using a sample of 713 banks from the BankScope database across 13 countries and 12 years. This large panel allows us to quantify the effects of size on costs. Given these estimates of size on the margin and therefore on borrowing costs we look at the impacts of reducing bank size on sustainable output in the Euro Area countries using our global model, NiGEM. It is clear that small countries are more adversely affected than large ones when bank size falls.

The Structure of the European Banking System

We analyse the ownership structure of the banking system in selected EU countries (see table 1) using data from three sources. We obtain ownership information from the Bankscope database (Bureau van Dijk); information about foreign claims from the Bank for International Settlements (BIS) consolidated banking statistics[1]; and Monetary and Financial Institution (MFI) total assets or lending from the Bundesbank.

From the Bankscope database, we used data concerning the ownership structure of the European banking system, focusing on large banks in our selected countries. Our sample excludes the central bank, specialized governmental credit institutions and multi-lateral government banks. Ownership structure is categorized according to the Bankscope definition of 'Ultimate Ownership'; we specified 25.01% as 'the minimum percentage that must characterize the path from a subject company up to its Ultimate Owner (Global and Domestic)' (see Bankscope for further details).

[1] Table 9B, consolidated foreign claims of reporting banks, immediate borrower basis.

The following diagram demonstrates a country-specific bank structure.

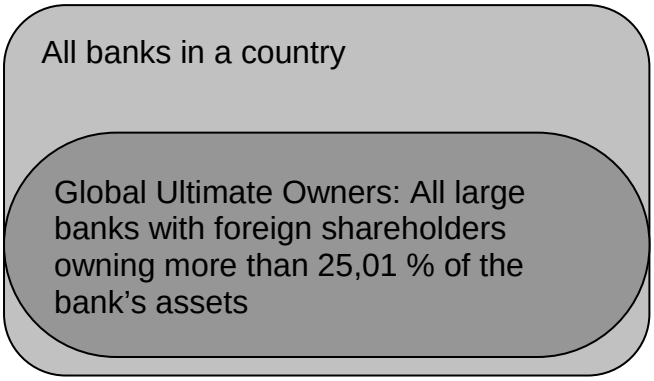


Figure 1. Schematic of banking system ownership structure

We establish Global Ultimate Ownership by first identifying the nationality of the known foreign shareholders of each individual bank in the sample. If in a given host country, several banks have Global Ultimate Owners of a common nationality, we sum up all the assets for those banks, and the resulting value equals the proportional ownership of that country (or nationality) in the host country's banking system. If the shareholder is unknown, we treat that bank as a domestic bank.

Therefore, our 'ownership' variable, j_a, is defined as follows:

$$j_a = (\text{Total shares})_{aj} / (\text{Total assets})_j$$

Hence country *a*'s ownership in host country *j* is given by the ratio of country *a*'s total shares in banks located in country *j* to the total assets in country *j*'s banking system.

We use this data to construct Table 1, which summarizes the ownership structure of banking systems in our sample countries for 2009. The countries in our sample can be divided into three groups according the proportion of foreign ownership of their banking systems, defining 0<10, 10<30, and 30< per cent of foreign-owned shares as the boundaries. The first group (0<10 per cent) includes Sweden, Spain, Italy, France, Switzerland, Greece and Germany. The second group (10<30 per cent) consists of Denmark, Austria, UK and the Netherlands. Finally, the third group (30< per cent) comprises Belgium, Portugal, Finland, Ireland and Luxembourg. Foreign ownership exposure of more than 10 per cent is in italics.

Table 1. Bank ownership, country by country, as proportion of total assets.

	AUSTRIA	BELGIUM	DENMARK	FINLAND	FRANCE	GERMANY	GREECE	IRELAND	ITALY	LUXEMBOURG	NETHERLANDS	PORTUGAL	SPAIN	SWEDEN	SWITZERLAND	UNITED KINGDOM
AUSTRIA	0.8249								0.0011							
BELGIUM	0.0011	0.6930			0.0331	0.0062	0.0000	0.0132	0.0131	0.0835	0.0051					0.0000
DENMARK			0.8375	0.0571						0.0045						0.0004
FINLAND				0.4782												
FRANCE		0.2046			0.9367	0.0045	0.0717	0.0129	0.0228	***0.1671***	0.0003	0.0023	0.0005		0.0199	0.0004
GERMANY		0.0059			0.0002	0.9039	0.0000	***0.2231***	0.0070	***0.2492***	0.0003	0.0062	0.0042		0.0027	0.0007
GREECE							0.9087			0.0196					0.0000	0.0012
IRELAND								0.4036		0.0000					0.0000	0.0018
ITALY	***0.1661***	0.0005			0.0001	0.0472		0.0156	0.9512	0.0757	0.0003				0.0053	
LUXEMBOURG					0.0001	0.0007				0.2883		***0.1597***		0.0011	0.0004	0.0001
NETHERLANDS		0.0728			0.0007	0.0117		0.0140		0.0153	0.7582	0.0000			0.0008	
PORTUGAL					0.0000		0.0144					0.6215	0.0019		0.0003	
SPAIN	0.0008	0.0039			0.0001	0.0034			0.0020			***0.1993***	0.9832		0.0003	0.0376
SWEDEN			***0.1409***	***0.4647***	0.0000	0.0067				0.0073				0.9921		
SWITZERLAND	0.0005	0.0066			0.0002	0.0048		0.0020		0.0210					0.9229	0.0407
UNITED KINGDOM		0.0111			0.0273	0.0026		0.0345	0.0004	0.0062	***0.2259***		0.0093	0.0046	0.0416	0.8153
others	0.0066	0.0014	0.0215	0.0000	0.0015	0.0083	0.0052	0.2811	0.0023	0.0622	0.0099	0.0110	0.0009	0.0022	0.0058	0.1017
Total Foreign	0.1751	0.3070	0.1625	0.5218	0.0633	0.0961	0.0913	0.5964	0.0488	0.7117	0.2418	0.3785	0.0168	0.0079	0.0771	0.1847

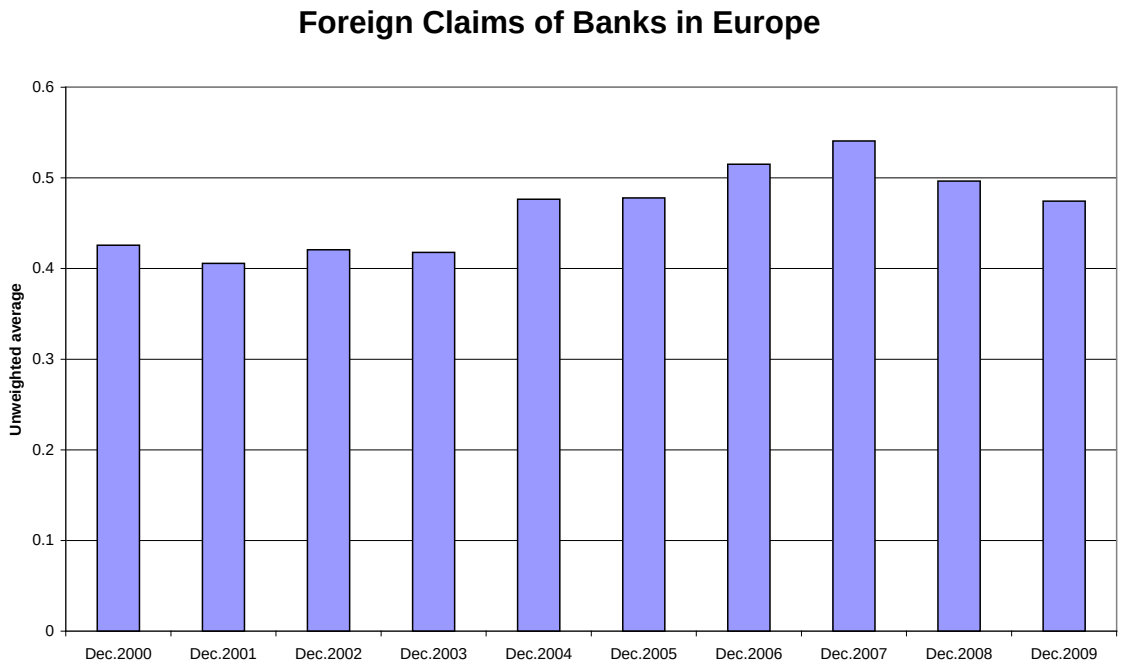
Source : BankScope, Bureau van Dijk

Table 2. Share of consolidated foreign claims of reporting banks over MFI total assets

	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	United Kingdom
Dec.2000	0.29	0.49	0.31	0.64	0.21	0.14	0.69	0.72	0.37	0.72	0.43	0.41	0.23	0.31
Dec.2001	0.44	0.50	0.34	0.48	0.19	0.14	0.58	0.73	0.35	0.65	0.41	0.36	0.21	0.30
Dec.2002	0.43	0.67	0.34	0.41	0.20	0.16	0.63	0.75	0.33	0.61	0.40	0.43	0.24	0.29
Dec.2003	0.42	0.61	0.34	0.40	0.20	0.16	0.57	0.83	0.31	0.62	0.41	0.43	0.25	0.30
Dec.2004	0.43	0.62	0.49	0.81	0.21	0.18	0.61	0.86	0.31	0.68	0.40	0.45	0.27	0.35
Dec.2005	0.27	0.60	0.51	0.75	0.21	0.19	0.72	0.81	0.31	0.74	0.52	0.49	0.27	0.30
Dec.2006	0.32	0.58	0.41	0.82	0.25	0.20	0.79	0.83	0.39	0.93	0.55	0.49	0.31	0.34
Dec.2007	0.48	0.55	0.41	0.85	0.24	0.26	0.76	0.97	0.38	0.95	0.59	0.50	0.32	0.31
Dec.2008	0.41	0.58	0.34	0.80	0.20	0.24	0.69	0.86	0.33	0.96	0.48	0.49	0.30	0.27
Dec.2009	0.33	0.76	0.40	0.72	0.18	0.24	0.50	0.80	0.31	0.94	0.40	0.50	0.27	0.29

Source: BIS, Bundesbank, Bank of England and National Bank of Denmark

Figure 2.



In addition to the Bankscope data, we used BIS data on foreign claims of globally-owned banks in our sample countries. We calculated the ratio of total annual reported claims of foreign banks[2] since 2000 to total MFI assets (lending). The majority of the data for the denominator was obtained from the Bundesbank, with the exception of data for Denmark and the United Kingdom which we obtained from their respective central banks. Data for Sweden and Switzerland was not available. The data are presented in the table 2, and the unweighted average across countries is reported in the Figure. This can be seen as an indicator of the internationalisation of banking within Europe. It reached a peak in 2007 and has declined since. The initial increase in cross border activity can be seen as a consequence of the growth of the Single Market in Financial Services, and it has been reversed somewhat in the last two years of our sample.

We then undertook a comparison of the market share of foreign claims in 2007 and 2009. It is worth noting that a foreign claim is different to ownership: Foreign claims are based on the reporting bank nationality defined by headquarter location, while ownership is based on the reporting bank shareholder characteristics. As described above, we define ownership by shares of 25.01 per cent or above. Market shares of foreign claims for 2007 are shown in table 3, and the changes in shares between 2007 and 2009 are given in table 4.

Table 4 illustrates that while the share of domestic banking in host countries has increased in the majority of countries, the change in total foreign market share is negative for all countries in the sample, indicating that European banking has become more territorialised and more national since the crisis. The only exceptions to this are Belgium for which international banking has surpassed domestic banking, and Portugal whose banking structure remains unchanged.

[2] Including banks whose ultimate owners are located in Australia, Austria, Belgium, Brazil, Canada, Chile, Chinese Taipei, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Mexico, the Netherlands, Panama, Portugal, Spain, Sweden, Switzerland, Turkey, the UK, and the US.

Table 3. Market share of foreign claims, 2007

2007	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	United Kingdom
Austrian banks	0.52	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Belgian banks	0.02	0.45	0.01	0.01	0.02	0.01	0.04	0.11	0.02	0.05	0.15	0.02	0.01	0.02
Danish banks	0.00	0.00	0.59	0.17	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.01
Finnish banks				0.15										
French banks	0.04	0.12	0.01	0.04	0.76	0.04	0.19	0.11	0.15	0.17	0.08	0.07	0.06	0.04
German banks	0.16	0.06	0.08	0.07	0.04	0.74	0.12	0.22	0.07	0.23	0.10	0.10	0.09	0.06
Greek banks	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Irish banks	0.02	0.01	0.01		0.01	0.01	0.03	0.03	0.02	0.00	0.01	0.02	0.01	0.02
Italian banks	0.16	0.02	0.00	0.01	0.01	0.06	0.02	0.03	0.62	0.06	0.02	0.02	0.01	0.01
Luxembourg										0.05				
Dutch banks	0.01	0.18	0.02	0.02	0.03	0.03	0.06	0.05	0.04	0.04	0.41	0.03	0.04	0.03
Portuguese banks	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.50	0.01	0.00
Spanish banks	0.00	0.02	0.00	0.01	0.01	0.01	0.00	0.03	0.01	0.02	0.03	0.17	0.68	0.03
Swedish banks	0.00	0.00	0.17	0.43	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Swiss banks	0.02	0.02	0.01	0.01	0.02	0.02	0.16	0.04	0.01	0.06	0.03	0.01	0.01	0.03
British banks	0.01	0.05	0.02	0.03	0.05	0.02	0.04	0.23	0.02	0.07	0.06	0.04	0.04	0.69
Others	0.03	0.06	0.05	0.04	0.04	0.04	0.05	0.11	0.03	0.21	0.08	0.02	0.03	0.06
All banks	0.48	0.55	0.41	0.85	0.24	0.26	0.76	0.97	0.38	0.95	0.59	0.50	0.32	0.31

Table 4 Absolute change in the market share of foreign claims between 2007 and 2009

	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	United Kingdom
Austrian banks	0.15	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Belgian banks	-0.01	-0.21	-0.01	-0.01	-0.02	-0.01	-0.03	-0.04	-0.01	-0.04	-0.13	-0.01	-0.01	-0.01
Danish banks	0.00	0.00	0.01	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Finnish banks	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
French banks	-0.01	0.26	0.02	0.00	0.06	0.00	-0.01	-0.04	-0.01	0.02	0.00	0.02	0.00	0.00
German banks	-0.05	-0.01	-0.02	-0.02	-0.01	0.02	-0.02	-0.02	-0.02	-0.01	-0.02	-0.01	-0.02	-0.02
Greek banks	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Irish banks	-0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	0.17	0.00	0.01	0.00	0.00	0.00	0.00
Italian banks	-0.04	-0.01	0.00	-0.01	0.00	-0.02	-0.01	-0.01	0.07	-0.02	0.00	0.00	0.00	0.00
Luxembourg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Dutch banks	0.00	-0.01	-0.01	0.00	-0.02	0.00	-0.03	-0.02	-0.03	-0.01	0.19	-0.01	-0.01	-0.01
Portuguese banks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Spanish banks	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	-0.02	0.00	0.05	0.01
Swedish banks	0.00	0.00	0.01	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Swiss banks	-0.01	-0.01	0.02	0.00	0.00	0.00	-0.15	-0.02	-0.01	0.01	-0.01	0.00	0.00	-0.01
British banks	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	-0.01	-0.02	0.00	-0.01	-0.01	0.01	0.00	0.03
Others	-0.01	0.02	0.00	0.01	0.00	0.01	0.01	-0.01	0.00	0.02	0.01	0.00	0.00	0.02
All banks	-0.15	0.21	-0.01	-0.13	-0.06	-0.02	-0.26	-0.17	-0.07	-0.01	-0.19	0.00	-0.05	-0.03

Cost of Funds

The recent trend towards re-territorialisation in the European banking system implies a down-sizing of individual banks from large multi-national corporations to smaller national firms. The economic impact of this restructuring can therefore be assessed from the perspective of bank size, on which there already exists a wealth of literature. One aspect of this is the inverse relationship between bank size (often measured by asset size) and the net interest margin (NIM). The NIM is the spread between a financial institution's gross earnings on interest-bearing assets and its interest expenses in funding those assets (alternatively seen as the spread between the return on investment and the return to savings). It is one of several measures of bank profitability, but moreover captures the functioning of banks generally in terms of efficiency and competitiveness, which in turn impacts on saving, investment and therefore growth (Demirgüç-Kunt and Huizinga, 1999: 2). The relationship between the NIM and bank size may consequently be driven by two factors; the earnings side of the spread and the costs side.

With regards to the first, the lending activity of small banks tends to be channelled into small business or personal loans which generate higher yields than larger loans, due to the associated higher expected losses and transaction costs. Furthermore, small banks tend to hold a larger percentage of their asset mix in such loans than in lower-yield investment securities. Large banks, on the other hand, are more able to take advantage of economies of scale, and also perhaps economies of scope in their more diverse array of products. This enables them to offer larger loans at more competitive rates. In addition, they tend to hold a higher proportion of their assets in lower-risk corporate or government bonds. Considering the other side of the spread, small banks often have lower funding costs as they rely on low-interest core deposits, whereas large banks tend to be dependent on costly and more volatile wholesale funding which is closely linked to the official bank rate. The combination of these characteristics means that the NIM tends to be larger for small banks. (For empirical evidence of this in the US, see the DBRS paper). As bank earnings on assets is, by definition, the costs of borrowing for consumers and firms, and this has direct implications for investment activity, we focus our econometric analysis on the earnings side of the NIM.

Much of the literature on net interest margins attempts to identify its determinants using an analytical framework that was first developed by Ho and Saunders (1981), in which they modelled bank interest margins as a function of managerial risk aversion, the size of bank transactions, bank market structure and the variance of interest rates. Since then, there have been a number of developments, including a paper by Demirgüç-Kunt and Huizinga (1999), where they tested a variety of banking, macroeconomic, regulatory, structural and institutional characteristics as determinants of bank interest margins. They find that larger bank asset to GDP ratios and lower market concentration ratios lead to lower interest margins (the former substantiating the inverse size-NIM relationship), and more notably perhaps that foreign ownership is associated with higher NIMs (this is more pronounced in developing countries).

More recently, Abrue and Mendes (2001) undertook a similar analysis, focusing on the determinants of interest margins and profitability in selected EU countries. They find that the NIM reacts positively to operating costs, implying that less efficient banks pass on higher operating costs to customers. In addition, higher bank capitalization ratios have lower funding costs due to lower expected bankruptcy costs, which impacts positively on the NIM. Abreu et al. also substantiate the importance of asset mix in determining the NIM, as they find that the loan/assets ratio is significant and positive. However, the authors do not find market share significant for the NIM, suggesting that product differentiation in traditional loans and deposits and therefore market structure in these products is not important. This implies that economies of scope are not an important factor in the ability of large banks to offer competitive rates on their investment activities.

More recent literature has begun to look more specifically at the relationship between bank size and the NIM, much of this focusing on Europe as the internationalisation of its banking sector in the five years or so up to 2000 provides an interesting forum for such investigation. Maudos et al. (2004) analyse the determinants of the NIM in Germany, France, the UK, Italy and Spain, and find that declining margins in the European banking sector over the period of 1993-2000 can be explained by increased market power and concentration (and thus decreased competition) as well as interest rate risk, credit risk, operating expenses and bank risk aversion. Market power, concentration and decreased competition are all associated with the banking sector becoming more oligopolistic (i.e. fewer, but bigger banks).

Kasman et al. (2010) investigate this further by examining the effects of bank consolidation in the new European Union members and candidate economies on the determinants of the NIM over two sub-periods, comprising the consolidation period of 1995-2000 and the post-consolidation period of 2001-2006. In accordance with the conclusions of the Maudos et al. paper, Kasman et al. note that the European banking structure over the entire time period examined was characterised by the cross-border expansion of financial intermediaries and by a 'wave of mergers and acquisitions…[leading to] a reduction in the number of banks in many old and new member countries' (Kasman et al., 2010: 649). Kasman et al. find that both bank size and managerial efficiency are significant and exhibit a negative relationship with the NIM over both sub-periods, suggesting that this relationship was robust to the structural changes that took place over this time period.

Econometric Analysis

We approach the same question but from the opposite angle; that is how bank size has affected the NIM (and thus consumer and firm borrowing costs) in order to analyse the effects of the fragmentation and re-territorialisation of bank ownership seen in Europe in the two years following the financial crisis. Bank specific data are derived from the Bankscope database over 1993-2008. We utilise the balance sheet variables total assets and loans, net charge-offs, and the ratios total capital ratio (risk adjusted) and Tier 1 ratio (risk adjusted) which represents core equity. The difference between these is obviously

the risk adjusted Tier 2 ratio. Macroeconomic data for inflation, GDP growth and house prices are obtained from national sources as collected in the NIESR NiGEM database.

Filtering the raw bank data, first, we exclude the central bank, government and multilateral institutions but include all other types of bank and bank-like financial institutions. We use the definition large banks as set out by Bankscope, as well as the consolidated balance sheet data only. This gives a greater role of banks in the US and Japan (which have long used consolidated data) compared with European countries, although since 2000 more and more European banks have also provided consolidated accounts. We also excluded banks with less than four years' continuous observations. An appendix details the country coverage. Charge offs are reported for all banks, and they are recorded as a percent of total assets, varying between 0 and 100.

To assess the impact of bank size on the NIM we use a normalised bank size variable (see Barrell et al, 2010). We calculated the mean and the standard deviation of the bank assets across all countries in each year, and then scaled each bank by the number of standard deviations of its assets from the mean. This accounts for increasing density in the time domain, as the number of banks in our sample rises over time, and hence it is possible that there is a downward trend in average share; our measure of size is designed to remove this problem. We estimate the relationship between the bank size and NIM (where the NIM is approximated by the ratio of net interest revenues to total assets) and model the NIM as a function of cyclical and structural factors.

Table 5. Bank size and net interest margins

	Net interest revenues /total assets	
	Coeff	t-Statistic
Lagged dependent	0.947250	187.9386
GDP (-1)	0.008476	2.022697
Real loan growth (-1)	0.002815	7.659274
Capital adequacy (-1)	0.002966	3.111707
Size (normalised) (-1)	-0.006276	-1.984718
Dummy: City National Bank in Florida in 2008	-3.476655	-395.9939
Dummy: Wachowia Bank of Delaware in 2008	-2.422364	-316.8895
Observations	**4374**	
Banks	**588**	

The NIM reflects the difference between the lending rate and the deposit rate and can be decomposed into several components – profits, operational costs, regulatory costs and potential costs of the default. Each of the components responds to either cyclical or structural shocks, or both. The set of variables is the following: GDP growth and the real growth of loans, both capturing cyclical fluctuations, the capital adequacy ratio which is an instrument of the regulatory policy and the bank size. We estimate our net interest

margin equation over the period 1995-2008 using the Least Squares method. Results of estimation are shown in table 5.

The estimation shows that the size of the bank negatively affects the NIM; that is, the bigger the bank, the greater its economies of scale and the lower the costs which allows it to diminish the difference between the lending and the deposit rate. The capital adequacy ratio has a positive effect on the NIM as it increases costs of the bank related to the regulatory freezing of the capital. GDP growth and the real growth of loans mirror the cyclical fluctuations of the margin, both through profits as well as the potential costs of the default. The default costs can be decomposed into those related to the systemic and those related to the individual risk. The systemic risk is cycle dependent and the individual risk is bank size dependent (as a bank's portfolio increases, the individual risk falls - and with banks getting larger the probability of a bank having a more diversified portfolio increases). The overall effect of GDP on NIMs is positive. The NIM depends also on the real growth of loans. The higher the growth of loans the higher the NIM.

As banks get bigger and exploit economies of scale in portfolio pooling, they can reduce their NIM. This holds under perfect competition. However, as the size of a bank goes beyond a certain point, the bank can start behaving as monopolist which will allow it to increase its margins again. To capture this nonlinearity we augment the baseline regression with our bank size variable squared. Results are shown in table 6.

Table 6.

	Net interest revenues /total assets	
	Coeff	t-Statistic
Lagged dependent	0.945261	184.0141
GDP (-1)	0.010057	2.259960
Real loan growth (-1)	0.002810	7.633527
Capital adequacy (-1)	0.002720	2.711285
Size (normalised) (-1)	-0.022085	-3.463115
Size (normalised)^2 (-1)	0.002620	3.211050
Observations	**4374**	
Banks	**588**	

The results confirm that, as they get bigger, banks can, to some extent, exploit their increasing market power and also gain from the economies of pooling risk which they pass on to their customers. The relative role of this factor is limited. We can say that as bank size increases bank margins fall until banks are more than four standard deviations above the mean of bank size which is around 0.15 per cent of the global total. We have computed the bank size by which diseconomies of scale could start playing a role. The value is time dependent, and also depends on the number of banks in the world banking system. In 2008, if total assets of a bank exceeded 2.3 per cent of total assets of the world banking system, the bank could have been considered as big. There was at least one bank in the US, UK, Germany, France, Japan and the Netherlands, whose assets exceeded 2.3 per cent of the global assets in 2008, as we can see from the table.

Research Questions Using NiGEM

Since the crisis began a major differential has opened up between the borrowing costs of governments of Spain, Portugal, Greece, Ireland and Italy on the one hand and Germany, the Netherlands, France etc. on the other. Where a banking system requires government support this risk premium applies to the affected banks. Even where this is not the case, there is a tendency for the risk premium to apply. There are other factors affecting individual bank's cost of capital e.g. exposure to sovereign debt of countries perceived to be at risk. What this means is that the cost of funds will differ across banks. It will tend to differ on a geographical basis depending on where a bank is headquartered. This will tend to result in some banks facing higher capital costs than others. This will tend to result in their reducing their balance sheets and also, quite likely, their geographical coverage. In a normal world banks which were "safe" would be able to raise cheap funds and expand, both within national boundaries and across them.

Using NiGEM we examine the effects of two different banking systems on the EU economy. We consider how the European economy (and national economies) would be affected by:

1. An EU banking system, where the scale and diversification of the system would allow it to raise funds at the lower end of the range that banks are currently experiencing. Apply a common, relatively low, risk premium. For example, if Dresdner Bank or Societé General were to expand into Spain and Portugal by acquisition, their lower cost of capital would see lower cost credit for borrowers in those countries and an increasing market share for the secure banks. In turn a lower risk premium would see higher growth.
2. An alternative "national " banking system where the cost of capital through the banking system attracted the current national risk premia. Apply national risk premia. This is the current case in quite a number of economies. It would see significantly lower growth in affected economies.

The Structure and Use of the NiGEM Model

For a macroeconometric model to be useful for policy analyses, particular attention must be paid to its long-term equilibrium properties. At the same time, we need to ensure that short-term dynamic properties and underlying estimated properties are consistent with data and well-determined. As far as possible, the same long run theoretical structure of NiGEM has been adopted for each of the major industrial countries, except where clear institutional or other factors prevent this. As a result, variations in the properties of each country model reflect genuine differences in data ratios and estimated parameters, rather than different theoretical approaches. The model has been in use at the National Institute since 1987, but it has developed and changed over that time. Some of its development was initially financed by the ESRC, but since 1995 it has been funded by its user community of public sector policy institutions. These currently include the Bank of England, the ECB, the IMF, the Bank of France, the Bank of Italy and the Bundesbank as well as most other central banks in Europe along with research institutes and finance ministries throughout Europe and elsewhere.

Each quarter since 1987 the model group has produced a forecast baseline that has been published in the Institute *Review* and used by the subscribers as a starting point for their own forecasts. The forecast is currently constructed and used out to beyond 2031 each quarter, although the projection beyond 2015 is a stylized use of the long run properties of the model. Since 1998, the model has also been used by the EFN Euroframe group to produce forecasts for the European Commission. Forecasts are produced based on assumptions and they do not always use forward looking behaviour. In policy analyses the model can be switched between forward looking, rational expectations mode and adaptive learning for consumers, firms, labour and financial markets. Policy environments are very flexible, allowing a number of monetary and fiscal policy responses. The model has been extensively used in projects for the European Commission, UK government departments and government bodies throughout the world. It has also contributed to a number of Institute ESRC projects.

Production and price setting

The major country models rely on an underlying constant-returns-to-scale CES production function with labour-augmenting technical progress.

$$Q = \gamma\left[s(K)^{-\rho} + (1-s)(Le^{\lambda t})^{-\rho}\right]^{-1/\rho} \qquad (1)$$

where is Q is real output, K is the total capital stock, L is total hours worked and t is an index of labour-augmenting technical progress. This constitutes the theoretical background for the specifications of the factor demand equations, forms the basis for unit total costs and provides a measure of capacity utilization, which then feed into the price system. Barrell and Pain (1997) show that the elasticity of substitution is estimated from the labour demand equation, and in general it is around 0.5. Demand for labour and capital are determined by profit maximisation of firms, implying that the long-run labour-output ratio depends on real wage costs and technical progress, while the long-run capital output ratio depends on the real user cost of capital

$$Ln(L) = \left[\sigma \ln\{\beta(1-s)\} - (1-\sigma)\ln(\gamma)\right] + \ln(Q) - (1-\sigma)\lambda t - \sigma \ln(w/p) \qquad (2)$$

$$Ln(K) = \left[\sigma \ln(\beta s) - (1-\sigma)\ln(\gamma)\right] + \ln(Q) - \sigma \ln(c/p) \qquad (3)$$

where w/p is the real wage and c/p is the real user cost of capital. The user cost of capital is defined as:

$$c = [(1-\mu)*(r + IPREM)*(1-CTAXR) + \mu*(r + PREM) + \theta]/(1-CTAXR) \qquad (4)$$

Equation (4) shows that the user cost of capital is influenced by corporate taxes (*CTAXR*) and depreciation (θ), and is a weighted average of the cost of equity finance and the margin adjusted long real rate (r), with weights that vary with the size of equity markets (μ) as compared to the private sector capital stock. Hence the investment premium (*IPREM*) directly feeds into firms borrowing costs and thus their investment decisions.

Business investment is determined by the error correction based relationship between actual and equilibrium capital stocks. Government investment depends upon trend output and the real interest rate in the long run. Prices are determined as a constant mark-up over marginal costs in the long term.

Consumption, personal income and wealth

Consumption decisions are presumed to depend on real disposable income and real wealth in the long run, and follow the pattern discussed in Barrell and Davis (2007). Total wealth is composed of both financial wealth and tangible (housing) wealth where the latter data is available.

$$\ln(C) = \alpha + \beta \ln(RPDI) + (1-\beta)\ln(RFN + RTW) \qquad (5)$$

where *C* is real consumption, *RPDI* is real personal disposable income, *RFN* is real net financial wealth and *RTW* is real tangible wealth. The net interest margin (or lending wedge, LENDW) feeds into the consumption decision through real disposable income, which comprises wages, government transfers and receipts on interest-bearing assets owned by the household sector net of borrowing costs. Borrowing costs, in turn, are influenced by the lending wedge, and so and increase in the lending wedge reduces real disposable income and thus impacts negatively on the consumption decision.

The dynamics of adjustment to the long run are largely data based, and differ between countries to take account of differences in the relative importance of types of wealth and of liquidity constraints.

Financial markets

We generally assume that exchange rates are forward looking, and 'jump' when there is news. The size of the jump depends on the expected future path of interest rates and risk premia, solving an uncovered interest parity condition, and these, in turn, are determined by policy rules adopted by monetary authorities as discussed in Barrell, Hall and Hurst (2006):

$$RX(t) = RX(t+1)[(1+rh)/(1+ra)](1+rprx) \qquad (A6)$$

where *RX* is the exchange rate, *rh* is the home interest rate set in line with a policy rule, *ra* is the interest rate abroad and *rprx* is the risk premium. . Nominal short term interest rates are set in relation to a standard forward looking feedback rule. Forward looking long rates are related to expected future short term rates

$$(1+LR_t) = IT^{T}_{j=1},\ (1+SR_{t+j})^{1/T} \qquad (A7)$$

We assume that bond and equity markets are also forward looking, and long-term interest rates are a forward convolution of expected short-term interest rates. Forward looking equity prices are determined by the discounted present value of expected profits

Economic impact of banking system restructuring

Having established the inverse relationship between bank size and the NIM, we now use the NIM (described below as the lending wedge, LENDW) and investment premium IPREM as proxies for bank down-sizing, in order to analyse the impact on output. If banks re-territorialise then the net interest margin will go up, and it will go up most in small countries. We may write the relationship between the change in size and the NIM as

DNIM = -0.022+0.0056* Size,

where size is measured in standard deviations. If we reduce bank size in Germany and the other large economies, France, Italy and Spain by 2 standard deviations then the net margin will rise by 100 basis points. The largest bank would then be below the maximum efficient scale rather than above it as is the case now. We reduce bank size by twice this in the small countries, Netherlands, Belgium, Portugal, Greece, Austria and Finland and given the scale of the Irish banking system relative to its GDP we reduce the average size of banks by an additional amount of the same size. The effects on output are given in Table 7. We assume that financial markets are forward looking, and equity prices and long term interest rates jump after a shock. This is because the monetary authorities react to the shock and change interest rates and markets react to these changes. We also assume that labour bargains take account of future inflation. Governments set their taxes in order to remain solvent and so when revenues fall, tax rates rise. In this version of NiGEM, we assume consumers are myopic and not forward looking. We apply shocks only to Euro Area countries.

There are three sets of factors that affect the long run impacts on output. Countries with higher capital output ratios will have larger effects as compared to others; this particularly affectsGermany compared to other large countries, However, the long run effects come through the user cost of capital, and this is the weighted average of equity and bank and bond finance. We are only raising the cost of non-equity finance, and hence France in particular is less affected because private and market equity finance are more important there than in the other large economies. Italy has the largest effect because it has the least developed equity market of the four large economies. Apart from France the decline in the banking sector scale economies reduces equilibrium output by 1 per cent. The long run effects on Greece, Portugal Austria and Finland are twice as large as this as they are also quite bank dependent and the shock is twice as large as their banks shrink. The Dutch and Belgian economies are less reliant on bank finance and, hence, the long-run impact of a similar shock is smaller. Ireland faces an even larger increase in margins, but as it is more similar to the UK, with a relatively strong reliance on equity finance[3],

[3] In the case of Ireland a substantial share of domestic output is accounted for by multinational companies, both foreign and national. These firms are not dependent on the Irish capital markets (including banks) to fund their activities.

the impacts are muted, and are the same size as the other bank dependent small economies.

Table 7. Effects of Raising IPREM and LENDW due to decrease in bank size, percentage difference in output from base, 2011

	Euro Area	Germany	France	Italy	Spain	Netherland	Belgium	Greece	Austria	Finland	Portugal	Ireland
2011	-0.12	-0.14	-0.06	-0.08	-0.28	0.02	0.07	-0.38	-0.33	-0.27	-0.41	0.05
2012	-0.36	-0.30	-0.15	-0.34	-0.84	-0.23	0.03	-0.93	-0.92	-0.81	-1.12	-0.01
2013	-0.51	-0.35	-0.20	-0.55	-1.21	-0.44	-0.16	-1.14	-1.27	-1.10	-1.54	-0.14
2014	-0.61	-0.38	-0.22	-0.68	-1.42	-0.55	-0.40	-1.25	-1.46	-1.30	-1.81	-0.31
2015	-0.67	-0.41	-0.25	-0.75	-1.52	-0.63	-0.62	-1.31	-1.56	-1.47	-2.00	-0.51
2016	-0.71	-0.43	-0.27	-0.79	-1.53	-0.69	-0.82	-1.36	-1.61	-1.59	-2.15	-0.71
2017	-0.74	-0.46	-0.28	-0.80	-1.48	-0.70	-0.96	-1.41	-1.61	-1.68	-2.26	-0.89
2018	-0.75	-0.48	-0.29	-0.80	-1.39	-0.69	-1.05	-1.45	-1.60	-1.73	-2.34	-1.06
2019	-0.75	-0.51	-0.29	-0.80	-1.29	-0.67	-1.10	-1.50	-1.58	-1.77	-2.38	-1.20
2020	-0.76	-0.54	-0.30	-0.81	-1.18	-0.65	-1.12	-1.55	-1.57	-1.79	-2.39	-1.31
2021	-0.77	-0.56	-0.30	-0.82	-1.09	-0.65	-1.12	-1.62	-1.58	-1.81	-2.38	-1.41
2022	-0.78	-0.59	-0.31	-0.84	-1.01	-0.67	-1.12	-1.69	-1.61	-1.82	-2.34	-1.49
2023	-0.80	-0.62	-0.31	-0.88	-0.95	-0.69	-1.13	-1.77	-1.65	-1.83	-2.29	-1.57
2024	-0.81	-0.65	-0.31	-0.91	-0.89	-0.71	-1.13	-1.86	-1.72	-1.84	-2.22	-1.64
2025	-0.83	-0.69	-0.31	-0.95	-0.85	-0.73	-1.14	-1.93	-1.79	-1.84	-2.13	-1.71
2026	-0.85	-0.72	-0.31	-0.99	-0.81	-0.75	-1.15	-1.98	-1.87	-1.84	-2.03	-1.78
2027	-0.87	-0.76	-0.32	-1.02	-0.78	-0.76	-1.16	-2.01	-1.94	-1.84	-1.92	-1.84
2028	-0.88	-0.79	-0.32	-1.06	-0.75	-0.75	-1.17	-1.91	-1.97	-1.80	-1.77	-1.89

Growth in the Euro Area is reduced by between 0.1 to 0.2 percentage points a year for 5 years, The short run effects depend upon the speed of adjustment of the capital stock and on the level of gross borrowing in the economy. If the personal sector has large borrowing as compared to income then a rise in borrowing costs that is not reflected in income on deposits will reduce consumption and demand quickly. Levels of personal sector debt are high in Spain, and it adjusts more quickly than do the other large economies. However if an economy is small and open then most of the effects leak out into imports, as in high borrowing Ireland, the Netherlands and Belgium where income adjusts slowly.

Spreads over German government bonds have risen in recent months, and these have caused the public finances to deteriorate in a number of economies. It is possible, especially given the scale of nationalisation, that these increases in spreads could pass on to bank borrowing costs. The Figure plots the government bond yield in our group of countries relative to Germany in the middle of October 2010, projected forward using the yield curve on government bonds in both countries in the comparison. It is particularly large in Greece, but was also large in Ireland and Portugal. There were also noticeable premia in Spain and Italy. These premia in the forward market are persistent, and if they spread to bank borrowing costs they will raise the user cost of capital and reduce sustainable output. They will also dampen output in the short run through increased borrowing costs facing households.

Figure 3.

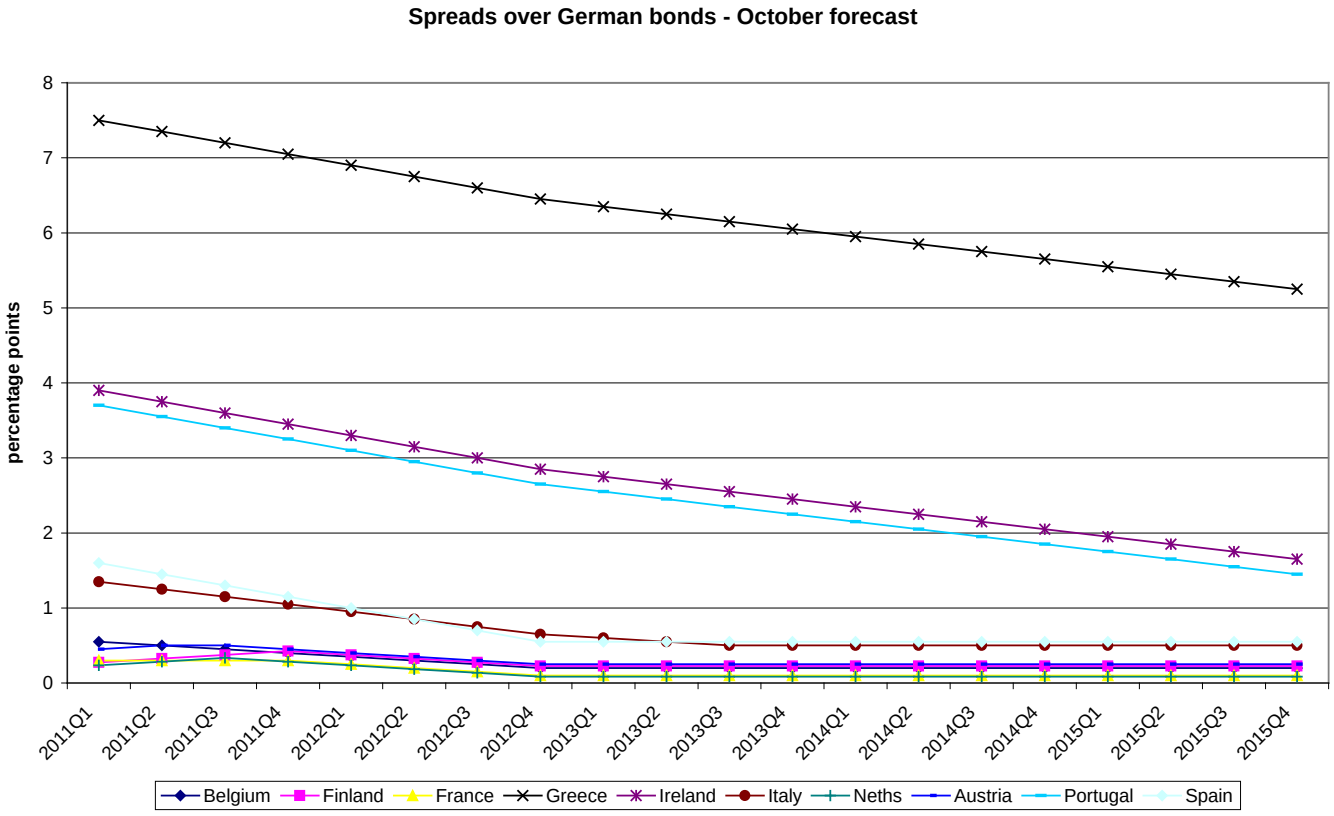


Table 8. Percentage difference in output from base induced by shock to IPREM and LENDW based on Long Rate spreads

	Euro Area	Germany	France	Italy	Spain	Netherland	Belgium	Greece	Austria	Finland	Portugal	Ireland
2011	-0.11	0.03	-0.02	-0.16	-0.43	0.08	0.02	-1.51	-0.06	-0.01	-0.62	-0.08
2012	-0.28	0.09	-0.03	-0.49	-1.06	0.14	0.05	-3.67	-0.13	-0.05	-1.63	-0.28
2013	-0.30	0.12	0.00	-0.58	-1.11	0.20	0.08	-4.39	-0.11	-0.02	-2.02	-0.38
2014	-0.29	0.13	0.02	-0.55	-1.04	0.17	0.10	-4.56	-0.10	-0.03	-2.16	-0.46
2015	-0.29	0.12	0.01	-0.51	-0.98	0.09	0.07	-4.51	-0.11	-0.05	-2.18	-0.53
2016	-0.29	0.10	0.01	-0.49	-0.92	0.02	0.00	-4.37	-0.13	-0.08	-2.10	-0.60
2017	-0.29	0.08	0.01	-0.47	-0.85	-0.02	-0.06	-4.18	-0.15	-0.09	-1.93	-0.65
2018	-0.28	0.07	0.01	-0.46	-0.78	-0.04	-0.11	-3.99	-0.17	-0.11	-1.70	-0.67
2019	-0.28	0.05	0.01	-0.46	-0.71	-0.04	-0.13	-3.80	-0.18	-0.12	-1.51	-0.68
2020	-0.27	0.04	0.01	-0.46	-0.65	-0.04	-0.13	-3.63	-0.19	-0.13	-1.35	-0.70
2021	-0.27	0.02	0.00	-0.46	-0.60	-0.04	-0.13	-3.47	-0.20	-0.14	-1.20	-0.71
2022	-0.27	0.01	0.00	-0.47	-0.56	-0.03	-0.12	-3.31	-0.21	-0.15	-1.05	-0.71
2023	-0.27	0.00	-0.01	-0.49	-0.52	-0.03	-0.12	-3.12	-0.21	-0.16	-0.91	-0.72
2024	-0.27	0.00	-0.01	-0.50	-0.49	-0.02	-0.12	-2.91	-0.22	-0.17	-0.77	-0.71
2025	-0.26	0.00	-0.01	-0.51	-0.47	-0.02	-0.11	-2.67	-0.23	-0.18	-0.65	-0.70
2026	-0.25	0.00	-0.01	-0.53	-0.44	-0.01	-0.11	-2.41	-0.23	-0.18	-0.53	-0.69
2027	-0.25	0.01	-0.01	-0.54	-0.42	0.00	-0.11	-2.15	-0.24	-0.19	-0.42	-0.68
2028	-0.24	0.01	-0.01	-0.55	-0.40	0.00	-0.10	-1.97	-0.24	-0.20	-0.33	-0.66

Table 8 gives our result for the Euro Area economy and, if contagion takes place to bank and private bond markets, the effects are marked. The effects are front loaded for everyone as premia were projected to fall. Clearly the largest effects in the short and long run are faced by Greece, where output growth would slow by 1 ½ a per cent a year for three years, with a cumulative loss of output of 4 ½ per cent. In the longer term some of this loss is recouped because households adjust their borrowing, but the long run effects on output still reduce it by almost 2 per cent. Portugal would face a similar sharp recession, albeit on half the scale. Once gain the impacts on Ireland in the short run are substantially absorbed by imports. Spanish growth would fall by ½ a percentage point for 2 years before recovering, again because of high levels of borrowing. The impact on Italy would be half the size in the short run as personal sector borrowing is much lower there.

Conclusion

The Single Market in Financial Services has meant that banks could become larger in scale, and hence borrowing costs for consumers and for firms will have been lower. We have shown that banks within Europe increased in size and became more international, at least until 2007, when that process went into reverse. We have used a micro data set to investigate the impact of size on banks Net Interest Margin, NIM, and have shown larger banks have smaller spreads between borrowing and lending rates for firms and households. As we have competition between deposit takers this largely reflects the fact that they charge their borrowers less. Lower borrowing costs for households raise their incomes and their consumption and investment in housing, whilst for firms they raise their investment and hence their capital stock and this, in turn, will raise sustainable output. Lower borrowing costs reduce the user cost of capital, and hence increase the equilibrium capital stock, and this would raise sustainable output. A one percentage point reduction in borrowing costs would raise Euro Area output by ½ per cent within four years and by ¾ of a per cent in the long run. However, larger banks also take more risks, and Darrell, Davis, Fic and Karim (2010) show.

After looking at the effects of bank size on borrowing costs, we investigate the potential impact of banks moving back into their home territory. They will become smaller, and economies will shrink. We first investigate the impacts on output in large and small countries showing that the effects are generally larger in small countries, and also larger in economies that are more dependent on bank finance for their business investment decisions. Over the last three years government borrowing costs have risen in a number of economies as compared to Germany, and if these spreads propagate themselves into the largely nationalised banking system of high debtor countries they will cause a sharp slow down in activity, especially in Greece, and to a lesser extend in Spain and Portugal and also in Ireland and Italy. Overall Euro Area growth would be 0.1 or 0.2 lower for a couple of years, but output growth in Greece might be 1 ½ percent lower than it would have been for three years. Competition in banking in the European Single Market in Financial Services has brought benefits and raised output, especially in the smaller economies. However, poor regulation at the Area level and the too big to fail guarantee have meant the costs may have outweighed the benefits.

A more “national” and fragmented banking system would have broader implications for the financing of economic activity in Europe. Larger firms, especially multinational firms. would be favoured over smaller firms because of their ability to access capital markets directly (through corporate bonds) and also because they have access to the banking sectors in the different jurisdictions in which they operate. Small and medium sized enterprises, and especially households, which are more dependent on the banking system will be most affected.

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