

Financial Supervision in an Integrating Europe: Measuring Cross-Border Externalities*

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Abstract

Against the backdrop of European integration, the debate on the need for European arrangements for financial supervision and stability is intensifying in the literature as well as in the policy arena. While there is a consensus that the need for European arrangements ultimately depends on the intensity of cross-border spillover effects or externalities within the European Union (EU), there has been no attempt to measure these cross-border externalities. The aim of this paper is to fill this gap. A new data set on cross-border penetration (as a proxy for cross-border externalities) of 30 large EU banking groups has been collected. Although a home country bias still exists, the data indicate that the number of groups that have the potential to pose significant cross-border externalities within the EU context is substantial and increasing. Within a four-year period (2000–03), we find a statistically significant upward trend of emerging European banking groups. Policymakers therefore face the

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challenge of designing European structures for financial supervision and stability to deal effectively with these emerging European banking groups.

I. Introduction

After the successful establishment of the European Monetary Union (EMU), the debate on the need of a 'European System of Financial Supervisors' is intensifying. The key question is whether it would be desirable to move from the present national structure to a European structure for financial supervision and stability and, if so, when.

The Ministers of Finance in the Ecofin Council recently reviewed the arrangements for financial regulation, supervision and stability in the European Union (EU). They concluded that further coordination and convergence between national financial supervisors is deemed sufficient at this moment in time (EFC 2002). The possible need of moving supervision to the European level has also been extensively debated in the literature (e.g. Prati and Schinasi 1999; Vives 2001). Against a backdrop of European integration, it is generally argued that it is no longer possible to manage financial stability at the national level. The failure of a pan-European bank may give rise to cross-border spillover effects or externalities; see De Bandt and Hartmann (2002) for a review of the literature concerning contagion. While there is a consensus that the need for European arrangements ultimately depends on the intensity of cross-border externalities, there has so far been no attempt to measure these cross-border externalities. The aim of this paper is to fill this gap.

The intensity of cross-border externalities is related to the share of cross-border business of banks. Anecdotal evidence suggests that cross-border banking is increasing. In addition to large banking groups, such as ABN AMRO and Deutsche Bank, which have a long-standing tradition of a pan-European (as well as global) coverage in their business, new cross-border groups are emerging. A well-known example is the formation of the Nordea Group out of leading domestic financial institutions in Sweden, Finland, Denmark and Norway. Nordea poses a challenge for Nordic supervisors to coordinate their efforts.

In this paper, we present comprehensive empirical evidence on the cross-border business of banks in the EU. While aggregate data on cross-border penetration are generally available, the existing data on the geographical segmentation of individual banks merely focus on a specific aspect of international banking activities (e.g. Berger et al. 2003). The empirical analysis in this paper is based on a new data set, comprising a cross-section of the 30 largest EU banking groups. Using a broad set of indicators for

geographical segmentation, it is found that a growing number of banking groups has a significant cross-border presence in the EU. The results indicate a statistically significant upward trend of emerging European banking groups. This implies that policy makers face the challenge of designing European structures to deal effectively with emerging European banking groups.

This paper is organized as follows. In Section II, the institutional setting of the current supervisory system is explained, followed by a review of the literature on financial supervision in Europe. Cross-border externalities appear to be underestimated in the nationally based supervisory system. Section III discusses the channels for cross-border contagion. Next, we investigate the presence of cross-border externalities in Section IV. Empirical evidence on the current level as well as the trend of cross-border externalities is presented. Section V analyses the findings of the empirical analysis. In the final section, we discuss the policy implications of the empirical findings and draw conclusions.

II. Related Literature on European Financial Supervision

A. Institutional Setting

The Maastricht Treaty has separated monetary policy from financial supervision and stability. While monetary policy is centralized in EMU, responsibility for financial supervision and stability remains in the national domain with a subordinate role for the European System of Central Banks (ESCB). According to Article 105(5) of the Treaty: 'The ESCB shall contribute to the smooth conduct of policies pursued by the competent authorities relating to prudential supervision of credit institutions and the stability of the financial system'. Padoa-Schioppa (2003) rightly notes that there is no historical precedent for the geographical separation of the monetary stability and financial stability functions of a central bank. In a similar vein, Thygesen (2003) argues that it might be difficult to achieve simultaneously a single financial market and stability of the financial system, while preserving nationally based prudential supervision.

The current system of prudential supervision in the EU is based on the principle of home country control combined with minimum standards and mutual recognition. A financial institution is thus authorized and supervised in its home country and can expand throughout the EU (by offering cross-border services to other EU countries or establishing branches in these countries) without additional supervision. The host country has to recognize supervision from the home country authorities. There are two arguments in

favour of home country control. First, it promotes the effectiveness of supervision, as the home supervisor is able to make a group-wide assessment of the risk profile and of the required capital adequacy of financial institutions (that is, the concept of consolidated supervision). In response to the emergence of financial conglomerates in the EU, the recently adopted Directive on Financial Conglomerates introduces a single coordinator – located in the home country – who is responsible for group-wide supervision of financial conglomerates. Second, home country control promotes the efficiency of supervision, as financial institutions are not confronted with different supervisors, which could otherwise result in duplication of efforts and a higher regulatory burden.

Home country control is applicable to financial institutions that offer cross-border services to other EU countries or establish branches in these countries. However, financial institutions also operate through subsidiaries (separate legal entities) in other countries for reasons of taxation and limited liability (Dermine 2003). These subsidiaries are separately licensed and supervised by the host country authorities (*de jure* control). The scope for control by host countries of these subsidiaries is limited in practice, as key decisions are often taken by the parent company in the home country and the financial health of the subsidiary is closed linked (via intra-group transactions and/or joint branding) to the well-being of the financial group as a whole. The effective control of large financial groups is primarily in the hands of the consolidated supervisor in the home country (*de facto* control).

While home country control may be useful for the effectiveness and efficiency of prudential supervision, home country authorities are not responsible for financial stability in host countries (Mayes and Vesala 2000). Increasing integration within the EU can give rise to cross-border spillover effects or externalities. This means that the failure of a financial institution in one country may cause problems in other countries. Therefore, it is questionable whether home country control for supervision and host country responsibility for financial stability are sustainable in an integrating European market.

The present organizational structure of crisis management in the EU has been reviewed in the 'Report on Financial Crisis Management' (EFC 2001). The guiding principles are that the instruments of crisis resolution are available at the national level and that costs are borne at the national level. As regards the instruments for crisis management, the Report notes a strong preference for private sector solutions as opposed to public intervention tools (e.g. bailout). In line with the allocation of supervisory responsibilities, the responsibility for the decision making in crisis situations regarding an individual institution and its branches rests with the home country authorities. However, it is the responsibility of the host country authorities

– and not that of the home country authorities – to monitor the stability of their financial system.¹ Moreover, the home country taxpayer may not be prepared to pay for cross-border spillover effects of a failure. The Report therefore calls for enhanced cooperation between home and host countries in the area of crisis management.

B. Literature on European Financial Supervision

The pros and cons of moving supervision to the European level have been extensively debated in the literature (e.g. Prati and Schinasi 1999; Favero et al. 2000; Vives 2001). Prati and Schinasi (1999) argue that national authorities are not well placed to manage a crisis involving pan-European banks. As pan-European banking groups emerge, supervisors with a national orientation are less likely to be able to assess bank soundness and systemic risk adequately. Moreover, in their view, recent experience demonstrates that the sharing of responsibilities between home and host supervisors has not been uniformly successful among the Group of Ten Countries (witness BCCI, Barings, Diawa and others). They conclude that the European Central Bank (ECB) should assume a more ambitious role in crisis management.

Favero et al. (2000) also observe that the emergence of transnational financial institutions raises new questions. They argue that the growing interbank transactions create a web of exposures capable of transmitting financial failures across Europe in a domino-like fashion. As a centralized solution is, in their opinion, not politically viable in the near future, they recommend measures to reduce interbank exposures by conducting, for example, secured interbank lending (repo transactions) rather than unsecured interbank lending. Moreover, they recommend fostering market discipline by introducing mechanisms for prompt corrective action and the orderly closure of failing financial institutions.

Vives (2001) also raises the question of conflict of interest between home and host authorities in a transnational crisis. The central bank and the national supervisor will, in principle, only take into account the consequences of failure in their national market, even though the failure of the institution may have adverse consequences in other countries. Moreover, Vives wonders whether sufficient help will be available in a general crisis. In

¹Host country authorities are responsible for the externalities of subsidiaries located in their country. However, in particular in a crisis situation, the financial health and the quality of the assets of a subsidiary may be difficult to separate from that of the financial group (e.g. funds may be channelled to the parent company). Host countries may thus be reluctant to contribute to a possible bailout.

a liquidity crisis, a shortage of eligible collateral may prevent the unlimited liquidity supply necessary to avoid a crisis. Furthermore, the failure of a large domestic institution may spread abroad through interbank commitments, thereby rendering the emergency assistance of the relevant national central banks insufficient to contain the crisis. Vives's solution to these problems is centralized supervision that internalizes the external effects between countries.

Finally, Freixas (2003) shows that in the current situation nationally based arrangements underestimate the externalities related to the cross-border business of financial institutions. As a result insufficient capital will be contributed and the financial institution will not be bailed out. Freixas (2003) pinpoints the public good dimension of collective bailout and shows why improvised cooperation between national authorities will lead to underprovision of public goods, that is, to an insufficient level of bailouts.

In sum, there is consensus that the determining factor for moving to European arrangements for financial supervision and stability is the presence of cross-border externalities. To avoid an insufficient level of bailouts, other – more centralized – coordination mechanisms must be explored. While a global jurisdiction does not exist, the Member States of the EU have the possibility to extend jurisdiction to the European level in order to take into account the social benefits of a possible bailout in other European countries (e.g. a European System of Financial Supervisors). To avoid any misconception on our position, the preferred route to solving a banking failure is a private sector solution; see also EFC (2001). The use of public money should only be considered, when the social benefits (in the form of preventing a wider banking crisis) exceed the costs of a bailout. The issue at stake here is that not only national but also cross-border externalities should be taken into account in the decision making. The need for European arrangements ultimately depends on the intensity of cross-border spillover effects or externalities within the EU. However, there is no empirical evidence on the intensity of cross-border externalities.

III. Cross-Border Contagion

This section investigates how financial problems occurring in one Member State can affect the health of the financial system in other Member States. First, we discuss the different channels through which shocks can be transmitted from one institution or market to others and illustrate the importance of these channels. Second, we present a way to measure the potential cross-border externalities posed by European-wide operating financial institutions that emerge as a result of integration of EU financial markets.

A. Contagion Channels

When a pan-European banking group is hit by a financial shock, two types of contagion risk occur. The first type of contagion risk occurs when the financial shock causes the institution itself to fail. We refer to this state of affairs as the first-round effect of financial contagion. In this round, financial problems spread throughout the institution and across borders to its foreign branches and subsidiaries. In particular, in countries where the financial system is dominated by foreign banking groups the consequences of these first-round effects can be significant.

The second type of contagion risk is the risk that the failure of an institution will be transmitted to other institutions because of explicit financial linkages between these institutions. This is referred to as the second-round effect of financial contagion; see also De Bandt and Hartmann (2002). The mechanism through which shocks propagate from one financial institution (or market) to another is the core of the systemic risk concept. Following, Saunders (1987), De Bandt and Hartmann (2002) distinguish two main channels in banking markets through which contagion can spread problems from one institution or market to others:

- the *real* or *exposure channel* that refers to ‘domino effects’ resulting from real exposures in the interbank markets and/or in payment systems, and
- the *information channel* that relates to the contagious withdrawals (*bank run*) when depositors are imperfectly informed about the type of shocks hitting banks and about their physical exposure to each other (*asymmetric information*).

Real or exposure channel

The first real channel for contagion is the interbank market. In the interbank market, the risk exists that the failure of one or a number of financial institutions will cause a severe shock to the financial system because of high exposures. As cross-border interbank exposures increase, problems in a bank cannot only cause internal problems, but also have the potential to jump over to banks in other Member States. Allen and Gale (2000) incorporate the role of the interbank market in a contagion model by focusing on the physical exposures among banks in different regions and the real linkages between regions.

With the onset of EMU, the national interbank markets in local currencies have shifted to an integrated and deep euro interbank market with multiple counterparts. The impact on financial stability at the European level is not

Table 1: Cross-Border Penetration of Banks: Interbank Assets in the Euro Area (in %)

Country	1997		1998		1999		2000		2001		2002	
	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>
Austria	56	18	63	16	65	14	61	18	61	18	61	18
Belgium	30	27	31	32	26	40	22	43	21	40	22	40
Finland	36	11	35	19	38	15	28	18	37	6	33	3
France	66	8	69	9	70	12	70	11	69	12	71	12
Germany	73	9	73	10	74	11	71	12	69	13	68	13
Greece	n.a.	n.a.	70	9	69	11	63	10	50	21	42	21
Ireland	41	17	46	23	36	29	35	29	36	25	34	26
Italy	57	16	53	24	59	22	63	20	67	17	64	19
Luxembourg	20	53	22	55	25	52	22	55	22	55	24	53
Netherlands	39	23	37	24	41	21	48	17	38	17	39	17
Portugal	43	30	43	29	52	23	39	23	37	34	37	37
Spain	71	13	71	15	72	17	68	18	71	15	69	17
Euro area	60	15	61	17	62	18	61	18	59	18	59	19

Source: Cabral et al. (2002).

Notes: Interbank assets from the 'Home' country (denoted by *h*) and 'Rest of Europe' (denoted by *e*) are measured as a percentage of the total interbank assets of a country's banking system. 'Home' is defined as domestic institutions; 'Rest of Europe' is defined as financial institutions from euro area countries exclusive of the home country. Figures for 1997–2001 are measured in the fourth quarter; figures for 2002 are measured in the first quarter. The abbreviation 'n.a.' means 'not available'.

clear-cut. On the one hand, there is more scope for diversification as the number of counterparts is larger than in the previous national markets. On the other hand, there is more scope for cross-border contagion as the share of cross-border activity has increased. Table 1 shows that the importance of cross-border activities in the interbank market differs considerably across the euro area countries. According to Cabral et al. (2002), this can be explained by the size of the local money market. In larger countries, more local counterparts are available, which results in lower cross-border interbank activities. Interbank business is thus strongly oriented towards the domestic market in countries like France, Germany, Italy and Spain. In smaller countries like the Benelux countries, Finland, Ireland and Portugal, cross-border activities (with euro area as well as non-euro area countries) account for at least 50% of interbank assets.

Second, within payment and settlement systems the risk exists that the failure of one or a number of financial institutions to settle their obligations causes other participants to fail as well. In the EU, the most significant payment system is the TARGET system, which started its operations in 1999. Currently, TARGET is built on the 15 national payment systems of the

former EU-15 Member States, complemented by the payment mechanism of the ECB and an interlinking mechanism that foresees in the actual processing of cross-border payments.² Although the majority of payment flows are domestic, there is a sizeable cross-border component of over 30% (TARGET annual reports 2000–03). There is also a recent trend towards consolidation of national security settlement systems within Europe (that is, Euroclear Group, LCH.Clearnet Group). While strengthening the Single Market for financial services, these EU payment and settlement systems increase the interdependence between EU Member States and serve as potential channels for cross-border contagion.

Information channel

The information channel relates to contagious withdrawals when depositors are imperfectly informed about the type of shocks hitting banks (idiosyncratic or systematic) and about their physical exposures to each other (asymmetric information). De Bandt and Hartmann (2002) distinguish three potential causes of systemic events related to asymmetric information and expectations. These are, first, the full revelation of new information to the public about the health of financial institutions, second, the release of a ‘noisy signal’ to the public about the health of financial institutions, and, finally, the occurrence of a signal which coordinates the expectations of the public but is not actually related to the health of financial institutions. In this respect, the assessment of financial supervisors and central banks of potential threats to the financial system and their view on how to deal with them (for example, through a Financial Stability Review) could influence the behaviour of depositors.

B. Cross-Border Externalities

Turning from the channels for contagion to the occurrence of a financial crisis, the literature on financial stability makes a distinction between general liquidity crises and institution-specific crises (e.g. Goodhart 2000; Schoenmaker 2003). General liquidity crises need to be resolved by the ECB by supplying liquidity to the market, without the specific need to obtain detailed supervisory information on individual institutions. This is the opposite of institution-specific crises, where national central banks need

²Central banks of the new Member States have the possibility – but not the obligation – to connect to TARGET. Participation in TARGET is only compulsory when they join the Economic and Monetary Union.

detailed information on the position of the respective institution (e.g. the availability of sufficient collateral) before granting any emergency liquidity assistance.

This paper focuses on the externalities of European financial institutions in the home country (h) and in the rest of Europe (e). More precisely, we focus on the first-round contagion effects of institution-specific crises. We argue that the share of cross-border business of financial institutions is a good proxy for the intensity of cross-border externalities, as cross-border business is a good indicator of the impact of a possible failure in the rest of Europe. This impact, based on cross-border business, is also relevant for the further spreading of contagion through the real or information channels, which are largely based on real or physical exposures (second-round contagion effects). Our hypothesis is the following: *if the social benefits of bailing out the activities of financial institutions in the rest of Europe are sufficiently high, then a move to European bailout arrangements may be optimal*. However, centralized supervision would also come at a cost as a result of a loss of flexibility. Within the framework of minimum harmonization of standards, as incorporated in the financial services directives, there is some, although limited, flexibility for national supervisors to conduct supervision (Dell’Ariccia and Marquez 2001).

In order to investigate whether the benefits of bailing out the activities of financial institutions in the rest of Europe are sufficiently high, we develop a tool that enables us to make a distinction between the activities in the home market (h), the rest of Europe (e) and the rest of the world (w). We define financial institutions (in particular, banks) that have the potential to pose significant cross-border externalities in the European context as follows:

1. 50% or more of their business is conducted abroad ($h \leq 0.5$) and
2. 25% or more of their business is conducted in other EU countries ($e \geq 0.25$).

The first criterion makes a distinction between domestic and international banks. Banks that conduct more than half of their business abroad are regarded as ‘international’. In the case of h is substantially smaller than 1, there is an insufficient level of bailouts. The second criterion identifies European banks among the international ones. International banks that conduct a quarter or more of their business in the rest of Europe are regarded as ‘European’. In the case of e is substantially larger than 0, a large part of the cross-border externalities (measured by $e+w$) are in the rest of Europe and can be internalized by moving the bailout decision to the European level.

IV. Empirical Evidence: Measuring Cross-Border Externalities

The aim of the empirical investigation of cross-border business of banks is twofold. First, what is the trend in cross-border banking? More particularly, has cross-border business increased since the establishment of EMU in 1999? Second, what is the current share of cross-border business of individual banks? How many 'European' banking groups have emerged? In order to answer the first question we look at a time series regarding the cross-border penetration of banks in Europe. The second question is answered by examining the foreign activities of a cross-section of individual banks.

A. Aggregate Data (Time Series)

At present, only aggregate data on cross-border penetration of banks are available (e.g. ECB 2003). An indicator to measure the degree of cross-border penetration is the geographical segmentation of banking assets. While assets are an often-used indicator, there is a drawback as off-balance sheet activities are not included in this indicator.

Table 2 gives an overview of the cross-border penetration of banking assets in the EU for the period from 1997 to 2002 (covering the former EU-15 Member States). The first column (*h*) shows the assets of domestic credit institutions as a percentage of total assets of credit institutions per EU country. The second column (*e*) shows the assets of branches and subsidiaries of credit institutions from other European Economic Area (EEA) countries as a percentage of total assets of credit institutions per EU country.

Table 2 illustrates that the average market share of the branches and subsidiaries established by banks from other EEA countries was approximately 13% in 1997 and slowly increased to 16% in 2002. In some countries, the cross-border penetration is substantially larger. In Luxembourg and Ireland, the market share of banks from other EEA countries is sizeable (94% and 37%, respectively, in 2002). In these countries, the presence of assets from EEA banks is primarily driven by a favourable tax regime. In Sweden, the market share of banks from other EEA countries has also become sizeable, after the merger of Nordbanken (Sweden) and Merita Bank (Finland) into MeritaNordBanken (with the holding company in Finland) in 1998. Furthermore, Belgium, Portugal and the United Kingdom have a rather stable market share of over 20% of banks from other EEA countries. Austria and Denmark have only recently experienced an increased market share of banks from other EEA countries (21% and 12%, respectively) resulting from cross-border mergers of, respectively, the HypoVereinsbank with Bank Austria and the Nordea Group with Unidanmark.

Table 2: Cross-Border Penetration of Banks: Assets in the EU-15 (in %)

Country	1997		1998		1999		2000		2001		2002	
	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>
Austria	97	3	97	2	97	2	97	2	80	19	79	21
Belgium	70	23	73	21	76	20	76	22	75	23	76	22
Denmark	96	4	94	6	96	4	95	5	89	11	88	12
Finland	92	8	92	8	91	9	93	7	93	7	92	8
France	86	7	88	7	89	6	79	12	81	11	82	11
Germany	96	2	96	3	95	3	96	3	95	3	94	5
Greece	81	11	86	9	86	10	80	14	81	14	79	17
Ireland	46	46	44	47	41	50	40	50	38	49	49	37
Italy	93	6	92	8	93	7	93	6	94	5	96	4
Luxembourg	7	83	6	88	5	88	8	86	6	87	0	94
Netherlands	93	5	93	5	94	4	89	9	89	10	90	9
Portugal	85	13	79	19	85	13	78	21	75	24	75	24
Spain	88	9	88	9	91	7	91	7	91	8	90	9
Sweden	84	15	66	32	69	29	57	41	46	53	39	59
United Kingdom	46	25	45	28	48	26	47	26	48	25	53	23
EU-15	77	13	77	14	78	13	75	15	74	16	75	16

Source: ECB (2003), own calculations.

Notes: New Member States are not included. Assets from the 'Home' country (denoted by *h*) and 'Rest of Europe' (denoted by *e*) are measured as a percentage of the total assets of a country's banking system. 'Home' is defined as domestic institutions; 'Rest of Europe' is defined as branches and subsidiaries from EEA countries exclusive of the home country; 'Rest of world' is defined as branches and subsidiaries from non-EEA countries (figures not shown). These three categories add up to 100%. The total for the EU-15 is calculated as a weighted average for the former 15 EU countries with total assets of credit institutions as weights. The abbreviation 'n.a.' means 'not available'.

EU, European Union; EEA, European Economic Area; ECB, European Central Bank.

Results

Table 2 shows that cross-border penetration is relatively low, but is gradually increasing. To test whether this increase is statistically significant, a statistical test proposed by Lehmann (1975) is applied.³ This test shows that the upward trend is significant at the 5% level ($p = 0.042$). Nevertheless, the results do not pass our test of significant cross-border business in Europe (50% or more abroad and 25% or more in the rest of Europe). However, data on individual banks, rather than banking systems as a whole, are needed to test the existence of an insufficient level of bailouts as argued in Section III.

³This test statistic is $D = \sum_{i=1}^n (T_i - i)^2$, where i indicates the year and T_i is the rank of the score of year i .

From a financial stability perspective, banking system data on the country level are illustrative. It needs to be pointed out that the extent of cross-border penetration is greater in the new Member States (these have not been incorporated in the aggregate data) than in the former EU-15 countries, except for Luxembourg and Sweden (in which the share of foreign banks in total assets is 100% and 61%, respectively, as set out in Table 2). According to the World Bank,⁴ eight out of the ten new Member States have a banking system in which 60% or more of the banking assets are in the hands of foreign-owned banks: Czech Republic (90%), Estonia (99%), Hungary (89%), Latvia (65%), Lithuania (78%), Malta (60%), Poland (69%) and Slovakia (86%). In these new Member States in particular, the consequences of first-round contagion effects can be significant.

B. Data on Individual Institutions (Cross-Section)

The next step is to analyse the cross-border business of a cross-section of individual financial institutions. Financial institutions can be divided into banking groups, financial conglomerates and insurance groups. Because of the relatively high liquidity risks resulting from short-term funding and the potential contagion risks through exposures on the interbank market and in the payment system, only the banking activities of a financial institution are eligible for liquidity support in extreme circumstances. Therefore, only the first two categories of financial institutions (banking groups and financial conglomerates) are included in our sample.⁵ Furthermore, banking groups can be divided into small-, medium- and large-sized banks. Small- and medium-sized banks in particular tend to be largely domestically oriented. To investigate cross-border penetration in Europe, we therefore focus on the cross-border activities of large banking groups and financial conglomerates.

There are different approaches to measure the cross-border business of financial institutions. Sullivan (1994) reviews 17 studies estimating the degree of internalization based on a single-item indicator. However, using just a single indicator increases the possibility for errors, as the indicator could, for example, be more susceptible to external shocks. Depending on the choice of indicators, this might provide a better approximation of the

⁴Bank Regulation and Supervision Database 2003, World Bank.

⁵Given the importance of financial conglomerates in the EU, financial conglomerates are included. In the remainder of this paper, we refer to banking groups and do not differentiate between banks and financial conglomerates. To deal effectively with such large financial service groups, supervisors should operate on a cross-sector basis. See Kremers et al. (2003) on the different models of cross-sector financial supervision.

degree of internationalization, but the choice of indicators may be restricted by data availability rather than by theoretical induction (Slager 2004).

We have collected a data set on cross-border penetration (as a proxy for cross-border externalities) of the 30 largest EU banking groups,⁶ based on the Transnationality Index (Slager 2004). This Index is calculated as an unweighted average of (i) foreign assets to total assets, (ii) foreign income to total income and (iii) foreign employment to total employment. To analyse how these indicators are allocated between the home market (*h*), the rest of Europe (*e*) and the rest of the world (*w*), we examine the consolidated income statements and balance sheets of the top 30 EU banking groups (see the Appendix for a description of the data analysis).

The indicators are constructed as follows:

- *Assets*: This indicator is composed of loans to banks, loans to corporate and retail customers and securities. If the group is involved in insurance activities, insurance investments and other insurance assets are included. It should be noted that off-balance sheet items are not included in this indicator.
- *Revenue*: This indicator is based either on gross or net income, depending on which standard is used in the geographical analysis of the annual report. Gross income includes interest income and similar revenues, dividend income, commission income, income on financial transactions and other operating income. If the group is also involved in insurance activities, general insurance premium income and income from long-term assurance business are included. Net income is obtained by deducting all relevant costs. However, a major drawback of net income is that this indicator may be biased, as foreign operations can, in particular in the starting phase, be less profitable than domestic operations. Moreover, net income is more volatile than gross income.
- *Employees*: This indicator measures the (average) number of employees. Because of technological developments like the Internet, the allocation of employees does not necessarily give a correct view of the cross-border activities of a bank. However, there is evidence that the use of the Internet as a vehicle to develop cross-border banking still remains relatively rare (ECB 2003). One of the main reasons for this is that the Internet is often used as a complementary channel to the branch network, which is by definition local.

⁶The top 30 EU banks used in this paper are based on the top 300 European banks in 2001 published by *The Banker* (2002). *The Banker* ranks these banks according to the strength of their Tier 1 capital as of year-end 2001.

In those cases, where data on more than one indicator are available, the Index is the average distribution of these indicators. Averages are used, as there is no perfect indicator for the degree of cross-border business of banking groups.⁷ Moreover, the more indicators are used, the better our approximation of the cross-border activities of these banking groups will be. Table 3 gives an overview of the Index for the cross-border business of each of the 30 banking groups.

Results

To interpret the data in Table 3, we first make a distinction between domestic and international banking groups. As defined in Section III, a bank is 'international' when 50% or more of its business is conducted abroad ($h \leq 0.5$). In Table 3, the banking groups that are considered to be 'international' have been shaded grey. Based on the second criterion ($e \geq 0.25$), Table 4 divides the 'international' banking groups into two categories: (i) EU banking groups and (ii) global banking groups. Table 4 shows that while only six institutions could be regarded as European in 2000, this number increased to nine in 2003. Moreover, in the same period the number of global banking groups decreased from five to four and the number of domestic banks declined slightly from 19 to 17 (see Table 3).

To test whether the increase in European banking groups is statistically significant we again apply the Lehmann test. This test indicates that the upward trend is significant at the 5% level ($p = 0.042$).⁸ This supports our finding that cross-border penetration of banking groups has increased within the EU. The creation of a new EU banking group through the takeover of Abbey National (UK) by Santander Central Hispano (Spain) in 2004 fits in with this upward trend.

Sensitivity analysis

Although the criteria for classifying banking groups are intuitive, they are somewhat arbitrary as well. We therefore also conducted a sensitivity analysis. To see whether more banks have the potential to pose 'significant' cross-border externalities in the European context, the criteria are lowered by 10% and by 20%, respectively. An 'international' bank is then defined as a

⁷Although 'assets' seems to be the most significant indicator from a financial stability perspective.

⁸Based on the available information we find that in 1998 and 1999, two and three banking groups, respectively, could be regarded as European. For the full 1998–2004 period, the Lehmann test would be significant at the 1% level ($p = 0.0014$). However, as a result of incomplete data these years are not included in Tables 3 and 4.

Table 3: Index for the Cross-Border Business of Top 30 EU Banking Groups

Banking groups	2000		2001		2002		2003		Capital strength (in € bn)
	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	<i>h</i>	<i>e</i>	
1. HSBC	33	6	36	7	31	5	24	6	31.2
2. Crédit Agricole Groupe	61	19	59	20	60	18	61	19	25.7
3. Deutsche Bank	41	29	39	30	31	36	25	41	19.5
4. Royal Bank of Scotland	76	7	74	6	74	6	77	5	19.5
5. BNP Paribas	48	21	46	24	45	25	47	25	19.1
6. HypoVereinsbank	62	19	50	29	44	33	48	33	17.0
7. HBOS	94	3	93	4	92	4	91	5	16.1
8. Barclays	76	7	78	6	79	7	80	8	16.0
9. ABN AMRO	34	33	33	34	31	35	28	36	15.1
10. Santander Central Hispano	28	10	34	10	38	14	45	16	13.6
11. ING Group	36	19	27	23	26	23	29	24	13.4
12. Rabobank	80	7	76	8	76	9	75	9	13.3
13. Société Générale	68	11	64	13	60	18	56	21	12.0
14. Lloyds TSB	84	8	87	6	88	6	94	3	11.8
15. BBVA	35	5	34	5	38	3	44	3	11.7
16. Banca Intesa	66	19	67	14	73	13	78	10	11.6
17. Fortis Group	45	27	41	43	42	28	44	28	10.2
18. Crédit Mutuel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	9.7
19. Commerzbank	77	13	72	21	74	16	75	15	9.6
20. Abbey National	95	5	93	4	93	4	97	3	9.5
21. Dresdner Bank	61	24	64	22	61	25	59	29	9.1
22. Groupe Caisse d'Epargne	n.a.	n.a.	n.a.	n.a.	70	26	50	38	8.9
23. Nordea Group	22	76	18	79	23	74	28	71	7.8
24. UniCredit	74	8	74	8	70	8	71	13	7.6
25. Dexia	52	48	56	40	53	40	54	37	7.6
26. Groupe Banques Populaires	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.5
27. Westdeutsche Landesbank	49	32	49	32	47	39	48	43	7.4
28. Bayerische Landesbank	63	18	65	19	71	17	72	14	6.9
29. KBC Group	45	36	45	36	40	38	40	40	6.9
30. Crédit Lyonnais	75	8	76	8	76	7	77	8	6.5
Number of EU banking groups		6		7		8		9	
Number of global banking groups		5		5		4		4	
Number of domestic banking groups		19		18		18		17	

Sources: Annual reports over 2000–03 and own calculations for the Index (see the Appendix; underlying data available upon request); *The Banker* (2002) for capital strength.

Notes: 'Home' is defined as a bank's business in its home country (denoted by *h*); 'Rest of Europe' is defined as a bank's business in other European countries (denoted by *e*); 'Rest of the world' is defined as a bank's business outside Europe (figures are not shown). The three categories add up to 100%. Banks are ranked according to 'capital strength' (Tier 1 capital as of year-end 2001) as reported by *The Banker*. The abbreviation 'n.a.' means 'not available'. International banking groups (defined as groups of which 50% or more of their business is conducted abroad) are shaded grey.

EU, European Union.

Table 4: Categories of International Banking Groups within Top 30 EU Banks

Category	2000	2001	2002	2003
EU	3. Deutsche Bank 9. ABN AMRO 17. Fortis Group 23. Nordea Group 27. Westdeutsche Landesbank 29. KBC Group	3. Deutsche Bank 6. HypoVereinsbank 9. ABN AMRO 17. Fortis Group 23. Nordea Group 27. Westdeutsche Landesbank 29. KBC Group	3. Deutsche Bank 5. BNP Paribas 6. HypoVereinsbank 9. ABN AMRO 17. Fortis Group 23. Nordea Group 27. Westdeutsche Landesbank 29. KBC Group	3. Deutsche Bank 5. BNP Paribas 6. HypoVereinsbank 9. ABN AMRO 17. Fortis Group 22. Groupe Caisse d'Epargne 23. Nordea Group 27. Westdeutsche Landesbank 29. KBC Group
Global	1. HSBC 5. BNP Paribas 10. Santander Central Hispano 11. ING Group 15. BBVA	1. HSBC 5. BNP Paribas 10. Santander Central Hispano 11. ING Group 15. BBVA	1. HSBC 10. Santander Central Hispano 11. ING Group 15. BBVA	1. HSBC 10. Santander Central Hispano 11. ING Group 15. BBVA

Source: Table 3.

Notes: International banking groups (less than 50% of business at home) are divided into EU banking groups (more than 25% of business in other EU countries) and global banking groups (less than 25% of business in other EU countries).

EU, European Union.

bank that conducts more than 45%, respectively 40%, of its business abroad ($h \leq 0.55$; $h \leq 0.6$). A 'European' bank is an international bank that conducts more than 22.5%, respectively 20%, of its business in the rest of Europe ($e \geq 22.5$; $e \geq 0.2$).

Table 5 shows the result of this sensitivity analysis. It reproduces the number of groups that would be regarded as European under the relaxation of the criteria and pinpoints the banking groups that would have been added. Based on the Lehmann test, we find that the new sequence under the 10% relaxation remains significant at the 5% level ($p = 0.042$), while the increase in the number of EU banking groups under the 20% relaxation is statistically insignificant ($p = 0.17$).⁹ The results of the relaxation of the criteria suggest that our results are somewhat, although not excessively, sensitive to the choice of the criteria.

Related studies

To analyse possible trends in European banking, our study combines a cross-section approach with a time-series approach. Berger et al. (2003) and Van der Zwet (2003) have also analysed cross-border data of individual financial institutions, but only provided a snapshot of cross-border business at one point in time. Nevertheless, it is instructive to compare our results with these studies. Berger et al. (2003) investigate a specific aspect of international banking (cash management services), while this paper employs a broad set of indicators. They model two dimensions of bank globalization: bank nationality (which refers to the location of a bank's headquarters relative to the host nation where the affiliate operates and the affiliate's corporate home is) and bank reach (which refers to the geographic scope and size of the chosen bank) in 20 European nations. Their data set is based on 1996 survey data and covers over 2,000 foreign affiliates of multinational corporations operating in 20 European nations and over 250 banks serving these affiliates. Out of the sample of 255 banks, eight banks are found to be recognizable as truly global banks in terms of coverage and size in Europe (global banks are defined as banks that provide cash management services to sample firms in at least nine out of the 20 European nations and have at least \$100 billion in worldwide assets as of year-end 1995). As is shown in Table 6, five of the global banks are based in Europe and the other three are from the US. Berger et al. (2003) conclude that the extent of future bank globalization may be significantly limited as many corporations continue to prefer local or regional banks for at least some of their services (such as cash management).

⁹It should be noted that the power of the statistical test is quite low in the case of a series of only four observations. Only if the four observations are exactly in ascending order, the test would yield a significance probability at the traditional level of 5%.

Table 5: Sensitivity Analysis

	Relaxation of criteria	2000	2001	2002	2003
Number of EU banking groups	10%	7	9	10	11
	20%	7	11	10	13
Banking groups added to the set of EU banking groups	10%	25. Dexia	5. BNP Paribas 11. ING Group	11. ING Group 25. Dexia	11. ING Group 25. Dexia
	20%		2. Crédit Agricole 25. Dexia		13. Société Générale 21. Dresdner Bank

Source: Table 3.

Notes: The criteria for EU banking groups are relaxed by 10% (less than 55% of business at home and more than 22.5% in the rest of Europe) and 20%, respectively (less than 60% of business at home and more than 20% in the rest of Europe).
EU, European Union.

Table 6: Global Banks in Cash Management

Bank name	Headquarters nation	Number of survey nations in which the bank operates	1995 worldwide assets (\$ billion)	American Banker rank, by 1995 worldwide assets
Deutsche Bank	Germany	10	502.3	1
ABN AMRO	The Netherlands	19	339.4	12
Crédit Lyonnais	France	9	337.6	13
Société Générale	France	19	324.8	17
BNP	France	12	323.5	18
Citibank	US	20	255.3	28
Bank of America	US	18	230.2	34
Chase Manhattan Bank	US	19	120.5	62

Source: Berger et al. (2003).

Notes: The table lists the global banks in their sample of over 250 banks. These banks provide cash management services to sample firms in at least nine of the 20 European nations in their sample and had at least \$100 billion in worldwide assets as of year-end 1995.

The conclusion that bank globalization may be limited in the future should be treated with care, as the survey data of their study refer to one year (1996). Our data show that there is a clear upward trend in the Europe-wide coverage of banks.

Van der Zwet (2003) examines the geographic distribution of revenues of the 38 largest financial groups worldwide in 2000. European financial groups (26 out of the total sample of 38) earn on average 45% of their revenues in their home country, 25% in other European countries and 30% in foreign non-European countries. However, the reported data do not provide a breakdown for individual financial groups. Although our paper focuses on banking groups in the EU, it is interesting to note that Van der Zwet (2003) shows that insurance companies are significantly more internationally oriented than banks. Whereas the banks in her worldwide sample have a clear home country bias, insurance companies have a foreign bias. Taken together, the largest financial groups appear to focus equally on home and foreign markets. Furthermore, Van der Zwet (2003) argues that European financial groups are most strongly internationally diversified.

V. European Dimension in Perspective

Our hypothesis in Section III is that if the social benefits of bailing out the activities of financial institutions in the rest of Europe are sufficiently high, then a move to European bailout arrangements may be optimal. The empirical results show that there is a clear and statistically significant upward trend of cross-border penetration within the EU. Out of a sample of 30 large EU banking groups we find that within a period of four years (2000–03), the number of groups that are considered ‘European’ and have the potential to pose significant cross-border externalities has grown from six to nine.

It should, however, be noted that not all of the ‘European’ banking groups in Table 4 are pan-European. There are some banks that focus on a specific region in Europe and can be regarded as ‘regional’ European banks. The German HypoVereinsbank has taken over Bank Austria in Austria and the overriding part of its business is conducted in Germany and Austria. Fortis primarily operates in Belgium and the Netherlands. Similarly, the Nordea Group primarily operates in the Nordic countries. Nordea holds 40% of banking assets in Finland, 25% in Denmark, 20% in Sweden and 15% in Norway. Therefore, Nordea can also be seen as a regional ‘European’ financial institution. With the acquisition of 60% of the Italian bank Banque Sanpaolo, Groupe Caisse d’Epargne also became a regional European banking group. Supervision of these ‘regional’ European banking groups requires coordinated decision making between the various national authorities

within the region (through, for example, Memoranda of Understanding (MoUs)) rather than a European supervisor. In this way, the cross-border externalities in the European context can be internalized through regional decision-making arrangements.

Moving to the 'pan-European' banks, Table 6 confirms our finding that Deutsche Bank, ABN AMRO and BNP Paribas have spread their activities throughout Europe; they operate cash management services in 10, respectively 19 and 12, European countries (Berger et al. 2003). The Westdeutsche Landesbank also operates throughout Europe (including Eastern European countries and Turkey). The KBC Group occupies a leading position in Belgium as well as in its second home market in Central and Eastern Europe. Next, combining Tables 5 and 6, Société Générale could also be regarded as 'European'. While Société Générale is a borderline case in Table 5 (labelled as 'European' when the criteria are relaxed by 20%), its cash management business covers 19 European countries.¹⁰ To internalize the cross-border externalities of these pan-European banks, European structures for decision making between home and host countries for financial supervision and crisis management are needed.

Turning to the global banking groups, HSBC, Santander Central Hispano and Banco Bilbao Vizcaya Argentaria can truly be labelled as 'international'. HSBC is one of the largest banking groups in the world and its network covers 76 countries in Europe, the Asia-Pacific region, the Americas, the Middle East and Africa. Santander Central Hispano is the largest banking group in Spain and with the takeover of Abbey National in 2004 is now one of the larger groups in Europe (not yet incorporated in our data set, which covers 2000–03). Santander Central Hispano also has a strong presence in Latin America. Banco Bilbao Vizcaya operates in 35 countries but its primary markets are Spain and Latin America. The ING Group is also regarded as a global banking group. This is because the insurance activities outside Europe make up the largest portion of the activities of the ING Group. If one were to look solely at the banking activities of ING it should be classified as a 'European' bank. The international cross-border externalities posed by global banking groups cannot be internalized by European supervisory arrangements, as they fall (at least for a large part) outside the jurisdiction of the EU.

¹⁰Berger et al. (2003) also regard Crédit Lyonnais as a bank with a broad coverage in Europe, while in our view this bank is too domestically oriented (about 75% of its business is conducted in the home country) to be labelled 'international' or 'European'. This is because of different definitions and different time periods. Berger et al. investigate a single aspect of international banking (cash management), while our paper investigates a broad set of indicators (assets, revenues and employees). More importantly, Crédit Lyonnais was forced to reduce its foreign business in the large restructuring in the mid-1990s.

The need for a centralized response could be even greater when a trans-European bank is headquartered outside the EU. If banks like Citibank, Bank of America, Credit Suisse or UBS (the last two banks belong to the top 30 banks in Europe, but Switzerland is not a member of the EU) run into difficulties, how would handling that crisis be organized in the EU, especially when there are differing bankruptcy laws in the various EU countries? This is a highly relevant question for further research but falls outside the scope of this paper, which deals with arrangements within the jurisdiction of the EU.

VI. Policy Implications and Conclusions

If a financial crisis occurs, the private sector should be involved as much as possible in the resolution (EFC 2001). However, situations can occur in which a bailout is needed to prevent undue systemic risk. This is the case when the social benefits of a bailout are higher than the cost. The model of Freixas (2003) pinpoints the public good dimension of collective bailout and shows why improvised cooperation between home and host countries – a situation that corresponds to the current situation in the EU – leads to an undersupply of bailouts. The reason is that under national arrangements cross-border externalities are not taken into account when the home country is faced with the decision whether or not to bail out a financial institution. Therefore, we argue that if the social benefits of bailing out the activities of financial institutions in the rest of Europe are sufficiently high, a move to European arrangements (to take into account domestic and cross-border externalities) may be optimal. But what is the share of cross-border business in Europe?

Our data set of 30 large EU banking groups illustrates that although a home country bias still exists, the number of groups that have the potential to pose significant cross-border externalities in the EU context is clearly growing. Within a four-year period (2000–03) the number of banking groups that can be regarded as ‘European’ has grown from six to nine, when strictly applying our criteria that 50% or more of their business is conducted abroad (‘international’) and that 25% or more of their business is conducted in other EU countries (‘European’). These ‘European’ banks have the potential to pose significant cross-border externalities in the European context. Relaxing our criteria that 40% or more of a bank’s business is conducted abroad and that 20% or more of a bank’s business is conducted in other EU countries, four more banking groups would be regarded as ‘European’. Of the banking groups that satisfy the strict criteria, five are considered to be ‘pan-European’ groups with coverage throughout Europe, while four are ‘regional’ European banking groups with a more limited coverage (one or more neighbouring countries).

What do we conclude from our empirical findings? Both aggregate data and data on individual banking groups suggest that cross-border externalities within the EU have been rising. There is a clear and statistically significant upward trend of emerging European banking groups. Therefore, policy makers face the challenge of designing European structures for decision making between home and host countries for financial supervision and crisis management (e.g. Vives 2001; Kremers et al. 2003; Schoenmaker and Oosterloo 2005). When cross-border penetration increases through 'regional' European financial institutions, coordinated decision making between home and host countries for financial supervision and crisis management can be enhanced through MoU's between the national authorities involved (in the case of Fortis, for example, the Dutch and Belgian authorities have signed an MoU covering supervision and crisis management). But when more pan-European financial institutions emerge, policy makers may need to consider broader European solutions for financial supervision and stability to deal effectively with potential cross-border externalities.

Finally, this paper provides an overview of cross-border externalities in the EU. These constitute the so-called first-round effects of contagion. Supervisory structures should also be capable of accommodating the dynamics of financial markets. As European financial markets become more integrated, further research on the propagation of financial crises, for example via cross-border interbank linkages and payment systems (the second-round effects of contagion), may be useful.

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Appendix: Cross-Border Data on Individual Institutions

The figures in Table 3 of the main text are based on the following geographical segmentation of assets, revenue and employees. The data on these indicators have been gathered from the annual reports over the years 2000–03 of the 30 largest banking groups in the EU. The 30 largest banking groups are selected on their capital strength as of year-end 2001 (*The Banker* 2002).

Assets

The indicator 'assets' is composed of loans to banks, loans to customers and securities. If the group is involved in insurance activities, insurance investments and other insurance assets are included. Home country assets

(denoted by h), assets in the rest of Europe (denoted by e) and assets in the rest of the world (denoted by w) are measured as a percentage of total assets of the banking group.

Revenue

The indicator 'revenue' is based either on gross or net income, depending on which standard is used in the geographical analysis of the annual report. Gross income includes interest income and similar revenues, dividend income, commission income, income on financial transactions and other operating income. If the group is also involved in insurance activities, general insurance premium income and income from long-term assurance business is included. Net income is obtained by deducting all relevant costs. Home country revenue (denoted by h), revenue in the rest of Europe (denoted by e) and revenue in the rest of the world (denoted by w) are measured as a percentage of total revenue of the banking group.

Employees

The segmentation of 'employees' is based on the distribution of the (average) number of employees. Employees in the home country (denoted by h), in the rest of Europe (denoted by e) and in the rest of the world (denoted by w) are measured as a percentage of total employees of the banking group.

Calculation

The figures on the cross-border Index reported in Table 3 are the arithmetic average of the distribution of assets, revenue and employees (the data for each indicator are available from the authors upon request). However, if data on one (or two) indicator(s) are available, only this indicator is used. An indicator can only be utilized if the available data can be divided into a 'home' country component and a 'rest of Europe' component. However, in several cases (in particular that of employees) the available data can only be divided into a 'home' and a 'non-domestic' component. This problem has been solved by dividing the 'non-domestic' component into two equal parts: 'rest of Europe' and 'rest of world'. These data have only been used when no proper data on other indicators of the banking organization are available. Another method would be to use the number of subsidiaries in the 'rest of Europe' and the 'rest of the world' as weights. However, this does not improve the final results.