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Abstract

Over the past decades, banks have significantly increased their cross-border asset positions. The ongoing crisis on international financial markets has raised the question whether this increase in cross-border activities has allowed banks to diversify risks and to what extent it has increased banks' exposure to systemic risks. In this contribution, we review the existing empirical evidence.

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1 Motivation

Over the past decades, banks have significantly increased their cross-border asset positions (Figure 1). The ongoing crisis on international financial markets has raised the question whether this increase in cross-border activities has allowed banks to diversify risks and to what extent it has increased banks' exposure to systemic risks. In this contribution, we review the existing empirical evidence, and we draw tentative conclusions for economic policy.

The textbook story on the beneficial effects of international financial integration strongly relies on the assumption that financial integration provides investors with opportunities to diversify risks (See, e.g., Obstfeld and Rogoff, 1996, Chapter 1 and 5). By borrowing and lending abroad, investors can smoothen out shocks to their incomes and decouple their consumption from (temporary) shocks. Risks can also be shared across borders by holding an internationally diversified equity portfolio.

However, this textbook story does not take into consideration the following aspects of financial markets.

First, the textbook model assumes that trade in financial assets takes place frictionless and that information asymmetries do not matter. Yet, information asymmetries are at the core of modern finance and banking theories. Information costs and asymmetries in information can, therefore, be one factor behind the incomplete diversification of financial asset portfolios and the "home bias" observed in many portfolios (Lewis, 1999).

Second, individual household investors do typically not invest in international capital markets directly, but they rather access these markets through financial intermediaries such as banks. This involves transaction costs which tend to be higher for international than for purely domestic transactions. And only a fraction of households are actually active on (international) capital markets in the first place. For example, Mankiw and Zeldes (1991) have found that a substantial fraction of US households do not hold stocks, possibly because of the presence of credit constraints. And, despite the substantial increase in the width and depth of financial markets since the early 1990s, households' financial asset holdings remain highly concentrated within a relatively small share of the population.[1]

Third, given that financial intermediaries are of crucial importance for the actual cross-border asset holdings of countries and, ultimately, individual investors, the incentives

[1] See Lusardi and Mitchell (2007) for the United States or DIW (2007) for Germany.

of banks to actually diversify their portfolios are of crucial importance. These incentives, in turn, are to a large extent shaped by the regulatory environment and by the corporate governance structure of banks. As the ongoing crisis has forcefully shown, banks and other intermediaries that seemed relatively safe from an individual institution's point of view might have been excessively exposed to systemic risks (Hellwig, 2009; Sinn, 2009).

Given the complex nature of international financial markets and the multiplicity of regulatory issues that are currently being discussed, the purpose of this contribution is modest. Its focus is on the diversification of banks' asset portfolios and on financial contagion. In the following second part, we review theoretical arguments why banks should hold (internationally) diversified portfolios and why strategic complementarity in banks' behavior might lead to an increased exposure to systemic risks. In part three, we summarize the available empirical evidence on changes in cross-border capital flows and diversification patterns, and we draw tentative conclusions for the current policy debate in part four.

2 Why does international diversification of banks matter?

At the core of modern banking theory are the incentives of banks to optimally trade off risks and returns of their activities. Doing so, banks take into consideration the regulatory environment, and the resulting governance structures of banks differ from those observed in other industries. In contrast with non-financial firms, banks are more highly leveraged and particularly borrow short-term, they have a dispersed creditor (depositor) structure, and they invest into highly information sensitive assets (see, e.g., Kashyap, Rajan, and Stein, 2008).

What does this imply for the international diversification patterns of banks and the risk of financial contagion? Here, we discuss implications of a model by Allen and Gale (2000) which describes the conditions under which financial contagion can arise in regionally integrated financial markets. The model shows that idiosyncratic liquidity shocks hitting one region can become contagious if financial markets are imperfectly integrated. It assumes identically endowed consumers. Consumers deposit their endowments with their local banks, and consumers' liquidity preferences are unknown ex ante. Consumers have preferences for ëarlyör lateconsumption which is financed by withdrawing bank deposits. Each region hosts a representative bank which is exposed

to randomly fluctuating liquidity preferences. The aggregate liquidity demand across all regions remains constant. The banking sector is assumed to be perfectly competitive.

The model has three points in time. Initially ($t = 0$), banks invest the consumers' endowments either in a liquid "short" asset that produces a unit of consumption in $t = 1$ or in an illiquid "long asset" that has a higher return ($R > 1$) at $t = 2$ and a lower return ($R < 1$) if the long asset needs to be liquidated at $t = 1$. Since banks do not know ex ante which proportion of their clients are early consumers, cross-regional holdings of deposits among banks can provide liquidity insurance. If the demand for liquidity at $t = 1$ in one region exceeds its bank's investment in short assets, banks in this region can liquidate some of their interbank deposits in other regions which have an excess of short assets because a larger share of their non-bank clients turn out to be "late" consumers. However, if a bank experiences a liquidity shock in $t = 1$ so that it cannot meet the liquidity demand by liquidating all of its short assets, deposits with other banks, and the long assets, the bank goes bankrupt. Consequently, the claims of other banks on the troubled bank fall in value, which may trigger further bank failures. Hence, the model shows the trade-off between insurance against regional liquidity shocks that interbank linkages provide and the risk of financial contagion.

The model by Allen and Gale (2000) has been extended into different directions. Iyer and Peydro-Alcaldes (2005) show how a liquidity shock propagates in the interbank market due to strategic decisions of bank managers and depositors; Dasgupta (2004) shows that the probability of contagion increases in the size of interbank deposit holdings; and Cifuentes, Ferrucci, and Shin (2005) add asset price effects. They show that, when banks are faced with regulatory capital requirements and mark their assets to market, forced asset sales at the time of market turbulence may trigger a downward spiral in asset prices. This would have a negative impact on the liquidity and, eventually, the solvency of other financial institutions. Such asset price affects have been an important propagation and amplification mechanism during the current crisis (Hellwig, 2009).

The importance of asset price effects is also emphasized in Diamond and Rajan (2005) who show how liquidity shortages can stem from the banks' asset side such as cash flow delays, not from the liability side in the form of liquidity shocks. Even if there are no ex ante links between banks, contagion can arise since the failure of one bank negatively affects the available liquidity for other banks. Allen and Gale (2004) also offer a model of contagion which is driven by a fall in asset prices. The central idea is that, if a sufficiently large group of banks defaults and liquidates its assets, this

drives down asset prices. Consequently, more banks default, liquidate assets, and this exacerbates the downward pressure on prices.

In sum, these theoretical models have a couple of implications for the international transmission of shocks through cross-border banking. First, the models show how an initially small liquidity shock can propagate to other regions through the interbank market. Second, the probability of a contagious liquidity crisis depends on the degree of integration of markets. If banking systems are only loosely integrated (disconnected financial structures), the risk of contagion is small. The risk of contagion increases for intermediate levels of financial integration (incomplete integration), and it declines again as financial markets are fully integrated (complete integration). Third, the size of the liquidity shocks relative to the size of the liquidity buffer that banks hold affects the probability of a financial crisis. If a shock hits a region with a small liquidity buffer, the probability of a crisis is high. Fourth, forced asset sales by troubled banks may depress asset prices to the extent that other (otherwise healthy) banks holding these or similar assets would experience a significant deterioration of their financial positions.

The underlying assumption of the above models is that banks optimally diversify (liquidity) risk by holding interbank deposits in other regions. Banks have no incentives to act strategically in expectation of, for instance, a bail out operation by the central bank. This assumption is not innocent. Instead, the ongoing crisis has shown that banks may actually hold very similar portfolios, which exposes them to similar macroeconomic shock such as a change in US interest rates or housing prices.

Farhi and Tirole (2009) have a model which can help explain such seemingly coordinated behavior of banks. In their model, banks choose similar exposures to macroeconomic risks. Hence, there is endogenous macroeconomic uncertainty which results from a strategic complementarity in the choices of banks - the larger the number of banks holding similar portfolios, the more likely is a bail out through monetary policy if macroeconomic conditions worsen. Banks want to fail when the largest possible number of other banks is failing. The predictions of this model differ from standard predictions of portfolios models, which would imply that banks *minimize* the correlation to aggregate risk. One implication of their model is that banks react in a similar way to macroeconomic shocks and that they respond in a similar way to policy measures (such as a lowering of interest rates). Farhi and Tirole (2009) also argue that optimal regulation is characterized by a pecking order, and that banks should be regulated according to their size, their exposure to macroeconomic risks, and their weight in the central bank's objective function.

In sum, these models raise a couple of interesting questions related to the degree of diversification of banks' international portfolios and the exposure of banks to macroeconomic risks. In the next section, we turn to empirical evidence on these issues.

3 How diversified are international bank portfolios?

Cross-border assets of commercial banks have increased substantially over the past three decades (Figure 1). Measured in relation to GDP and on average across all countries included in Figure 1, cross-border assets were about 24.4% in the late 1970s but they had reached up to 176.3% in 2007. However, individual countries exhibit a very different degree of cross-border assets and liabilities. While, at the end of the sample period, Ireland's and Switzerland's cross-border assets reached about 400% of their respective GDP values, this figure lies only between 20% and 30% for the US and Italy.[2]

As regards the impact of the current crisis, there is evidence of a decline in cross-border financial flows (IMF 2009; BIS 2009). This effect seems to have hit particularly the emerging markets, thus aggravating the effects of the crisis. This could by a cyclical effect, which is reversed as the effects of the crisis dissipate. However, there might also be a change in the long-run patterns of financial integration as banks in many countries are encouraged by policymakers to lend domestically (IMF 2009).

The importance of cross-border assets reported in Figure 1 does not provide us with information on how diversified these assets are. In this section, we thus review empirical evidence on determinants of financial integration and the degree of diversification of banks' asset portfolios.

3.1 Measurement of financial integration

While many studies have looked into the degree of integration of financial markets, only a sub-set of studies uses data about banks' international portfolios. These studies, which are typically based on bilateral data provided by the Bank for International Settlements (BIS), are interesting in our context since barriers to the integration of (banking) markets can also serve as barriers to the diversification of risks across borders.

[2] In the case of the US, this partly reflects country size which also shows up in a comparatively low degree of trade integration. In the case of Italy, it may reflect different strategies of banks compared to those in other countries of similar size.

Generally, banks' international activities are constrained by both, regulatory barriers and information costs (Buch, 2003). Also, the importance of information costs, measured through the geographic distance between countries, has hardly changed over time (Buch, 2005). Another set of studies analyzes the impact of macroeconomic conditions on the cross-border activities of commercial banks. In Blank and Buch (2009), the focus is on the long-run determinants in a cointegration framework. This paper finds that market size, interest rates, and international trade patterns shape the international activities of banks. Buch, Carstensen, and Schertler (forthcoming) focus on the short-run response of cross-border banking to GDP and interest rate shocks. Using bank-level data, Goldberg (2001) reports that US banks lend counter-cyclically to markets abroad, and that the sensitivity of US lending to domestic growth differs across emerging and developed countries. In a recent paper, Kalemli-Ozcan, Papaioannou and Peydro (2009) use data about bilateral linkages among industrial countries over the past thirty years. Their special focus is on the impact of the Euro on cross-border financial linkages. They find a significant impact, which they relate mainly to the elimination of currency risk. Finally, Aviat and Coeurdacier (2007) report a strong correlation between banks' international asset holdings and international trade.

In sum, these studies provide information about the short- and long-run determinants of cross-border asset holdings of banks and thus on potential barriers to diversification of risks. From a policy standpoint, the importance of cultureänd information costs suggest a limit to what may be achieved in terms of integration by deregulation of formal economic barriers. Yet, the studies reported so far do not allow measuring the actual degree of diversification achieved. This is an issue to which we turn next.

3.2 Measurement of diversification

While the degree of (international) diversification in equity portfolios has been the focus of many studies in international finance, the degree of diversification of bank portfolios has not been studied very extensively. One main reason for this is data availability. Studying the relevance of, for example, the mechanisms underlying the financial contagion model by Allen and Gale (2000) requires the availability of bilateral, country-by-country data about banks' international investments, preferably broken down by types of borrower.

In Figure 2, we provide a rough measure of the degree of diversification of banks' international portfolios, which draws on Obstfeld (2007). Using aggregated data about cross-border financial linkages (including non-bank assets and liabilities), he applies the Grubel-Llyod index known from the empirical trade literature. In the case of financial

diversification, the index is defined as

$$GL = 1 - \frac{|A_{it} - L_{it}|}{A_{it} + L_{it}}$$

where A_{it} and L_{it} are total cross-border assets and total cross-border liabilities of country i at time t, respectively. An index value of one indicates full diversification (diversification finance), while an index value of zero reflects pure one-way asset-trade (development finance). Obstfeld finds that there was a sharp increase in the index over the past decades for emerging market countries, but a very flat development for high-income countries.

Figure 2 takes a closer look at the development of the Grubel-Lloyd index for banks' cross-border assets and liabilities for individual high-income countries. While it confirms the flat development over time for Belgium, Switzerland, France, and Great Britain, we see a decline in the index for Germany and Japan starting roughly in the mid-1990s. According to this measure, these two countries have seen a decrease in risk diversification. In the case of Japan, this can be explained by its low interest rates, which drove capital out of the country and discouraged the inflow of foreign capital. A closer look at bilateral data indicates that the decline in the Grubel-Lloyd index for Germany seems to be driven by an increased exposure to claims vis-à-vis the US.

The Grubel-Llyod index relies on aggregate data about cross-border assets and liabilities and allows only indirect inference with regard to the actual degree of diversification in banks' asset portfolios. Bilateral data about banks' international asset positions provides more detailed evidence on the degree of diversification. To determine the degree of diversification of cross-border asset positions, different measures of concentration can be used. The Herfindahl-Hirschman Index (HHI) is probably the best-known measure of concentration. It is defined as

$$HHI = \sum_{i=1}^{N} s_i^2,$$

where s_i denotes the market share of cross-border assets in country i. Hence, the HHI is defined as the sum of the squared market shares of each recipient country. Squaring the market shares stresses the importance of large positions in a certain country by assigning a larger weight to them. The index ranges from $1/N$ to 1, where an index value of 1 indicates complete concentration. If diversification is complete, the index takes on the value of $1/N$. The HHI has the advantage that it incorporates positions in all recipient countries, not just the largest ones. The k-bank concentration ratio (CR_k) is highly correlated with the HHI, though slightly different in construction.

It is defined as

$$CR_k = \sum_{i=1}^{k} s_i,$$

where k is the number of the countries with the largest shares in cross-border assets from a given reporting country used for construction. In contrast with the HHI, the CR_k only takes the largest cross-border positions into account. It also ranges between 0 and 1, taking on its lowest value for a large number of partner countries that are of equal size.

Figure 3 displays different concentration measures for our sample of high-income countries. The HHI is relatively low for these countries and has not changed markedly much over the past years, one notable exception being Ireland. This seems to indicate that countries are relatively well diversified regarding their cross-border asset positions. While the HHI has hardly changed over the last years, this is not true for the 3-bank and 5-bank concentration ratio. It has increased for most countries in our sample. This indicates that the overall diversification of cross-border assets has remained more or less constant over time, but that it has increased for the largest five partners.

A few recent studies have also applied empirical tools known from the international finance literature to banks. In this literature, the deviation of actual portfolio holdings from an optimal portfolio serves as a measure of the degree of home bias. Ahearne, Griever, and Warnock (2004), for instance, use the share of the capitalization of a given stock market in the global stock market capitalization as a proxy for optimal portfolio shares. Comparing this to the actual structure of asset portfolios of US investors, they find home bias that is related to empirical measures of information costs. A similar empirical model is used by De Santis and Gérard (2006) who use data provided by the IMF's international portfolio investment survey. They find a significant decline in home bias across Europe, Australia, New Zealand, and Singapore for equity and bond markets, and this decline was largest for countries in the Euro Area.

Arguably, analyzing banks' portfolio diversification is more difficult than an analysis of international equity or bond portfolios because many assets that banks hold are not traded. Hence, it is difficult to define the relevant rates of return and the risk patterns of these assets. Using market data about bond spreads as a proxy for expected returns on banks' assets, Buch, Driscoll and Ostergaard (forthcoming) still compute optimally diversified international loan portfolios for banks located in France, Germany, Italy, the UK, and the US, using a mean-variance portfolio model with currency hedging.

They compare these benchmark portfolios with the actual cross-border asset positions of banks and ask whether the differences are best explained by regulations, institutions, cultural conditions, or other financial frictions. Their results suggest that both culture and regulations affect the probability of a country being overweighted in banks' portfolios.

A few recent studies study diversification patterns at the bank-level. Hayden, Porath, and Westernhagen (2007) use micro data for German banks. They find only moderate gains from diversification, which depend very much on the individual bank's risk level. Using a sample of 42 countries for the period 1995-2002, Choi and Kotrozo (2006) look at the impact that geographical diversification has on banks' stock returns. They find that banks that are geographically more diversified have higher relative levels of risk, but are also more profitable.

These studies improve upon studies using aggregated data by taking into account portfolios patterns at the bilateral (country) level. But they do not provide evidence on the structure of individual bank portfolios, nor do they answer the question whether individual banks behave in a coordinated manner - as suggested by the model by Farhi and Tirole (2009) - and thus systematically expose themselves to (the same) macroeconomic risks.

3.3 Measurement of financial contagion

The degree of diversification of individual banks (or countries) provides little information about the risk of financial contagion or common exposures to macroeconomic risks. This, in turn, requires information about system linkages among financial institutions and thus about the possible exposure of the system to systemic risk. The IMF (2009, Chapter 2) suggests the following proxies: (i) the network approach, (ii) the co-risk model, (iii) the distress dependence matrix, or (iv) the default intensity model. The network approach accounts for the effect of the institution's linkages to other institutions, and it requires a comprehensive cross-border matrix of bilateral linkages. One starting point to study systemic connections is correlation and cluster analyses. Observations on how these measures change over time can provide information about which institutions' failure would affect others. The IMF (2009) finds that, during normal times, financial institutions cluster together based on geography and their primary line of business. During crises periods, in contrast, financial institutions cluster primarily along the lines of cross-border groupings.

Measures of financial contagion - both within and across countries - have also been

developed in previous literature on banking. In this literature, four main approaches can be distinguished.

A first set of studies uses counterfactual simulations to assess the risk of interbank contagion resulting from exposures in the interbank loan market. One group of papers examines whether there is a danger of contagion in a particular banking system (Degryse and Nguyen, 2007; Upper and Worms, 2004; Upper, 2006). These studies usually focus on one country using national data provided by credit registers, supervisory reports, or on direct bilateral linkages. Other papers quantify the magnitude of systemic risk. Elsinger, Lehar, and Summer (2006), for instance, use market information of ten large UK banks to analyze their insolvency risk over a one-year horizon. Schoenmaker and Oosterloo (2005) take the share of cross-border banking of the largest EU banking groups as a proxy for the risk of cross-border contagion. They find that, between 2000 and 2003, the number of banking groups that have significant cross-border presences in Europe increased from six to nine, and they interpret this as a sign that the potential for cross-border contagion has grown as well. Degryse, Elahi, and Penas (2009) apply counterfactual simulations in a cross-country setting. Using the BIS Consolidated Banking Statistics for the period 1999-2006, they find that a shock that hits one country can affect the stability of the whole financial system and that the speed of contagion has increased in recent years. Furthermore, they find contagion effects to be most severe for countries that are close to each other in a geographical sense.

A second set of studies is based on bank equity prices. Hartmann, Straetmans, and de Vries (2005) estimate contagion in Europe and the US. They find cross-border contagion risk in the Euro area to be relatively modest. Gropp, Lo Duca, and Vesala (2009) use a market price based measure to analyze econometrically whether the number of banks experiencing a shock in one country is correlated with the lagged number of banks experiencing a shock in another country. For the period of 1994 to 2003, they find evidence of significant cross-border contagion in Europe, which seems to have increased after the introduction of the Euro.

A third set of studies looks at the exposure of banks to macroeconomic shocks. This exposure has been the focus of empirical literature that has dealt with the bank lending channel (Kashyap and Stein, 2000). This literature estimates the response of bank lending to liquidity conditions and tests how this response depends on the stance of monetary policy. In a recent paper, Cetorelli and Goldberg (2008) apply this idea to an analysis of international banking. Their findings suggest that earlier evidence on the importance of the credit channel has overlooked an (increasingly important) margin of

adjustment: cross-border lending. Using quarterly information from all US banks filing call reports between 1980 and 2005, they find that the large globally-oriented banks rely on internal capital markets with their foreign affiliates to help smooth domestic liquidity shocks.

Finally, recent literature has proposed measures of diversification which take a systemic viewpoint. (See Tarashev, Borio, and Tsatsaronis (2009a, 2009b) and the literature cited therein.)[3] This literature acknowledges that there is a potential trade off between diversification of a portfolio of an individual investor and the degree of diversification for the system as a whole: Greater diversification of each portfolio reduces the riskiness of individual banks but may result in more similar portfolios and may thus increase the exposure of institutions to common risk factors. Drivers of systemic risk are banks' probability of default, the degree of size concentration, and banks' exposure to common (systematic) risk factors either because of institutions interconnectedness or because of similarity of their business model.

4 Summary and implications for regulations

The degree of diversification of banks' asset portfolios and the exposure of banks to macroeconomic risks can provide information about the degree of systemic risk in the financial system. If banks hold sufficiently diversified international portfolios, the risk of financial contagion can be reduced. However, banks may also expose themselves to common macroeconomic shocks if they expect to be bailed out by the monetary authorities.

This paper has reviewed the existing empirical evidence from the international banking literature on the degree of diversification of banks' international portfolios and the exposure of banks to macroeconomic risks. While there is a relatively large literature on the determinants of banks' foreign asset holdings, much less is known about the portfolio structures of foreign assets, the sources of funding that banks use internationally, and the effect of diversification on banks' exposure to macroeconomic risks.

Given this relatively fragmented knowledge base, it would be premature to derive far-reaching policy implications. However, a few observations seem worth noting:

First, despite the substantial increase in cross-border assets and liabilities of commer-

[3] Tarashev et al. (2009a, 2009b) propose a measure of systemic risk based on the game-theoretic concepts of the Shapley-value for each bank, which measures the systemic importance of each bank.

cial banks that could be observed in recent years, the degree of diversification of banks' foreign assets has not changed much from an aggregate point of view. This could be due to the fact that there are still many barriers to the optimal diversification of portfolios, but few empirical studies look at the degree of diversification and its changes over time. For empirical research, this implies that greater effort should be devoted to an improved understanding of network structures in (international) banking, diversification of banks' portfolios, and changed in these patterns. This, in turn, requires more research using micro-data and in particular using micro-data to develop implications for aggregate outcomes.

Second, for policy makers, the key lesson from the current crisis is to design regulations that encourage diversification of risks while preventing an increased exposure to systemic risks. This tasks is particular difficult since the importance of cultureänd information costs found in empirical work on banks' cross-border assets limits to what may be achieved in terms of integration by deregulation of formal economic barriers.

Third, many current policy discussions focus on the role of large banks as being of systemic importance for the banking system. However, what might be equally important is the joined exposure of many small or mid-sized banks to the same macroeconomic risk factors. Hence, reporting systems are required that allow a systematic analysis of exposures of large and small financial institutions.

Fourth, in current policy discussions, the risk of protectionism in the real sector takes on a prominent role. It is widely recognized that the adoption of measures to shield national markets from competition from abroad might have short-run benefits for individual countries but that, in the long-run, gains from international integration would be jeopardized. A similar reasoning applies to the integration of international financial markets, even though recent developments have shown the risks of an international integration process which is not backed by appropriate incentives in the financial sector. Hence, in parallel to regulatory policies that aim at establishing proper incentives, policy measures should not slow down of the globalization process.

Finally, in terms of future theoretical research, the crisis has shown the urgent need to marry banking and macroeconomic literature to improve our understanding of the functioning of financial markets and their interaction with the macro-economy. Recent empirical and theoretical work suggests fruitful avenues for future research in terms of building financial structures into macroeconomic models (see, e.g. Borio 2003).

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A Figures

Figure 1: Cross-Border Assets of Banks Relative to GDP (in %)

This Figure shows the percentage share of aggregate cross-border assets of banks based on the BIS Locational Statistics relative to GDP for Belgium, Switzerland, Germany, France, Great Britain, Ireland, Italy, Japan, and the US.

Source: Own calculations based on the BIS Locational Statistics

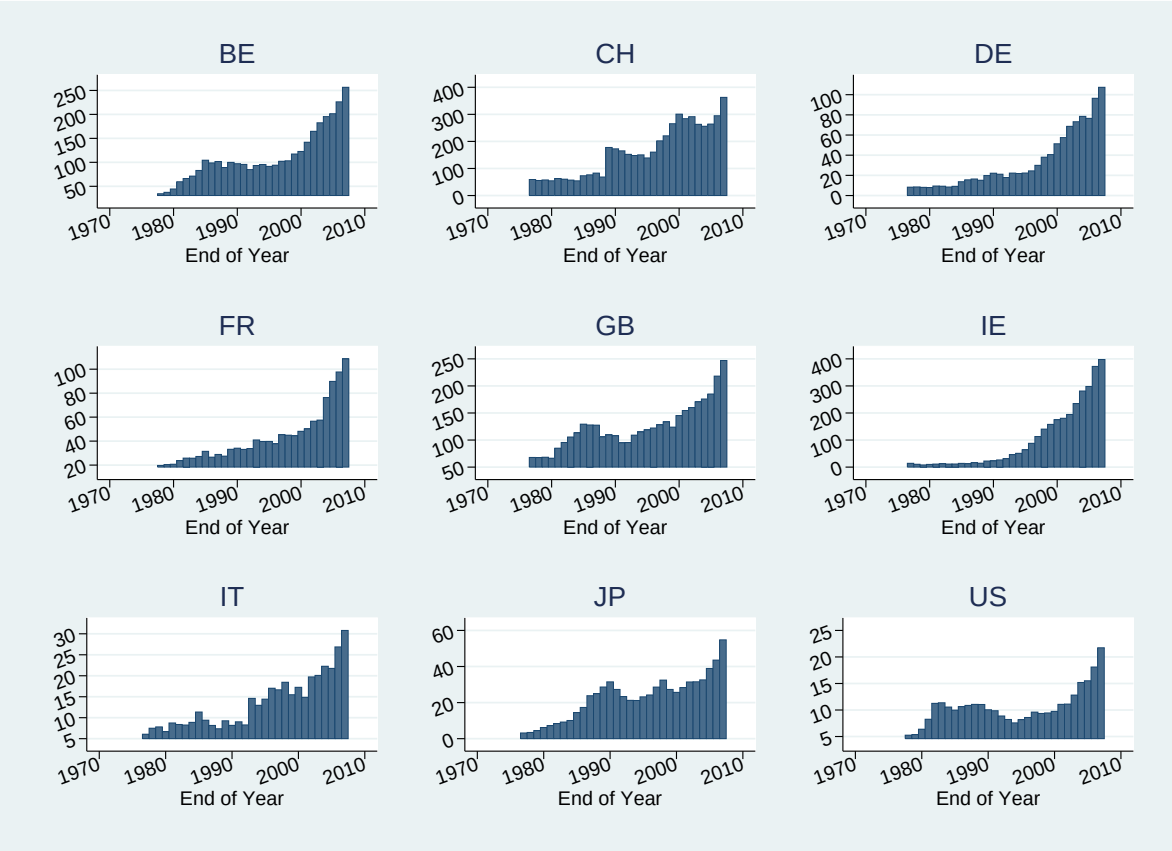

Figure 2: Grubel-Lloyd Index for International Banks

This Figure shows the Grubel-Lloyd Index based on aggregated data for banks' cross-border assets and liabilities for Belgium, Switzerland, Germany, France, Great Britain, Ireland, Italy, Japan, and the US. An index value of one indicates full diversification; an index value of zero pure one-way asset trade.

Source: Own calculations based on the BIS Locational Statistics

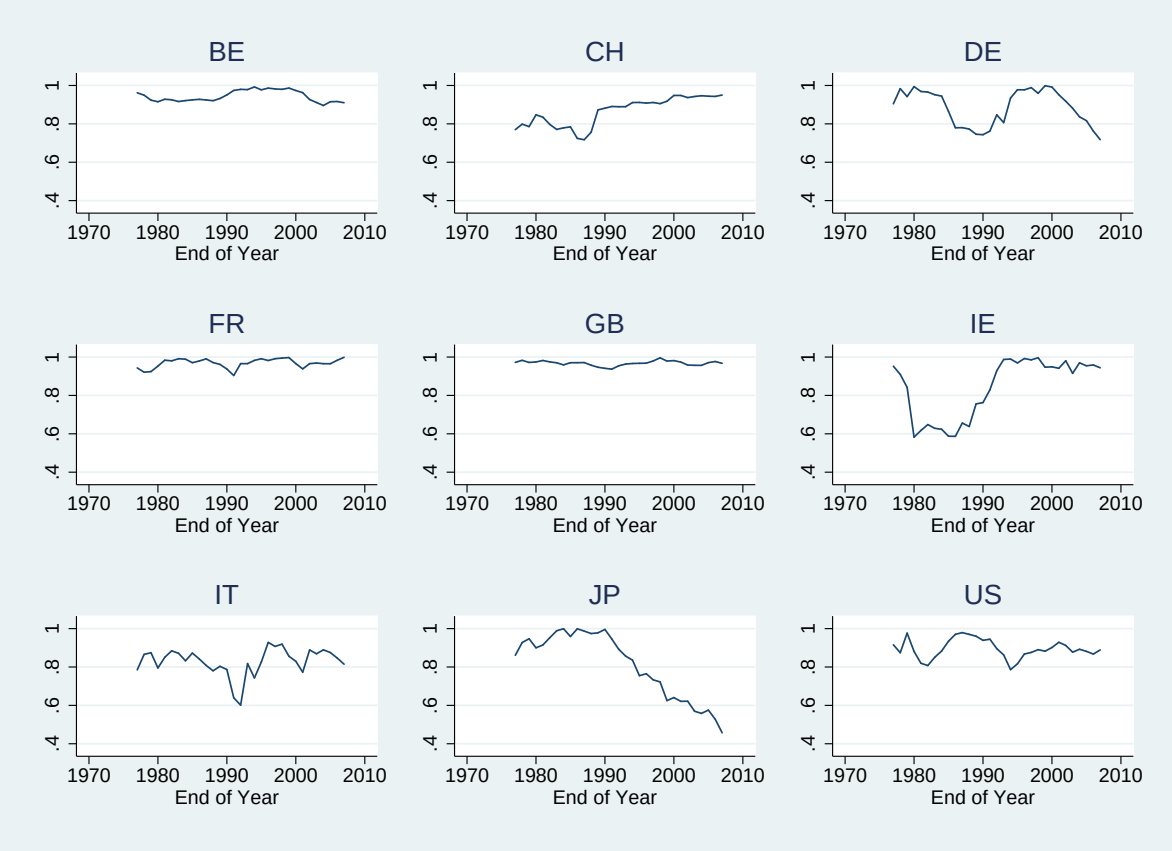

Figure 3: Concentration of Banks' Cross-Border Assets

This Figure shows different concentration measures for bilateral cross-border assets of banks as reported in the BIS Locations Statistics for Belgium, Switzerland, Germany, France, Great Britain, Ireland, Italy, Japan, and the US. CR3 and CR5 give the 3-bank concentration ratio and the 5-bank concentration ratio, respectively. HHI is the Herfindahl-Hirschman Index.

Source: Own calculations based on the BIS Locational Statistics