German banks in financial centers: how risky is their business?

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Abstract

Before as well as after the financial crisis of 2008, German banks' financial center affiliates have been on aggregate four times as large as the affiliates located elsewhere, and their balance sheet total has been half the size of the German parent banks' aggregate total assets. In addition, they are strongly connected with financial players in other financial centers, making them susceptible to distress in financial markets. German banks' affiliates in financial centers operate predominately as branches, as opposed to subsidiaries. This promotes the transmission of shocks to the parent bank due to the balance sheet consolidation. Financial center affiliates constantly have to roll over large amounts of short-term debt. As a consequence, they required larger injections of liquidity from their parent banks during the recent financial crisis. Balance sheet risk for parent banks is most likely to arise from financial center branches, as they are, in general, weakly capitalized. A change in accounting rules in December 2010 revealed their strong, formerly off-balance sheet involvement in derivatives trading.

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1. Introduction

While expanding their business internationally during the past decade, many banks established important affiliates in major financial centers, such as Luxembourg or the Cayman Islands. The financial crisis revealed the potential of financial shocks being transmitted via international financial platforms, where assets are traded globally and the interdependence of financial institutions is very high. It is, therefore, particularly important to understand how banks have made use of international financial centers.

This paper seeks to clarify the role of foreign affiliates of German banks located in financial centers, and to provide the first steps in analyzing whether they represented a source of risk to the stability of German multinational banks around the time of the financial crisis, as well as in its aftermath. The paper is intended to contribute to the policy debate regarding the regulation of financial centers, by providing often missing quantitative insights based on empirical research. For this purpose, the development of the financial center affiliates' assets and liabilities during the financial crisis is examined carefully, relative to other affiliates of German banks located outside these centers. Detailed data on German banks' foreign branches and subsidiaries reported to the Deutsche Bundesbank allow a deeper analysis of the affiliates' individual balance sheets, which, due to another focus and a different type of granularity, is not possible using reports made to the Bank for International Settlements (BIS) or data provided by individual host countries.

Many empirical studies on international banking include a lump-sum control for characteristics of banks located in financial centers, but do not discuss these differences in more detail. Partly owing to the lack of bank-level data, the literature on the role of foreign banks' affiliates in financial centers is rather limited. With a macroeconomic perspective, Errico and Musalem investigate legal and tax regimes of financial centers, and state that greater leeway for balance sheet management in these centers leads to higher solvency risk for banks.[2] They highlight the role of financial center affiliates of Asian and Latin American banks in several regional crises during the 1980s and 1990s. These affiliates had built up unhedged exposures that were concentrated on very few asset types. In addition, they had provided extensive funding to their parent banks, which ran into trouble as their financial center affiliates experienced large losses.

Williams et al. analyze the costs and benefits for countries of becoming offshore financial centers, using data on realized government revenues in existing financial centers.[3] They point to potential risk stemming from bank affiliates in financial centers, as they become larger than their parent banks. Dixon compares consolidated and locational claims of BIS-reporting banks on financial centers in order to determine the intermediation function of these platforms for several BIS-reporting countries.[4] She stresses the potential risk stemming from unobserved off-balance sheet activity of banks in financial centers, on which no data exist. Rose and Spiegel regard this very aspect as one of the major risks arising from financial centers.[5] They assess the influence of offshore financial centers on neighboring countries and come to the conclusion that loose regulation in financial centers encourages "bad behavior" on the part of source country banks, e.g., the building up of large off-balance sheet activity. Focusing on Chinese direct investment into financial centers, Sharman, on the other hand, emphasizes the advantage of these locations as points of access to international capital markets.[6] Furthermore, he states that they are platforms where investors can establish links to profitable investments in, for example, developing countries.

Financial centers have evolved in places that either used to have the most capital to export (e.g., New York and London) or aimed at diversifying away from agriculture and tourism (e.g.,

2 Errico and Musalem (1999)
3 Williams et al. (2005)
4 Dixon (2001)
5 Rose and Spiegel (2007)
6 Sharman (2012)

the Cayman Islands).[7] With new technology becoming available, some financial centers have become more and more specialized in providing international managerial and support services such as settlement and clearing (e.g., Luxembourg). In order to encourage this development, favorable fiscal and legal systems have been established in many financial centers, which make financial sector business more profitable. As early as 1999, Errico and Musalem called the number of financial centers that had evolved over time, and the subsequent volume of transactions carried out in these centers, a "pervasive practice."[8] The locational claims of BIS banks in the Cayman Islands, for example, amounted to 600 times its nominal gross domestic product (GDP) at the end of 2012. In comparison, BIS banks' locational claims on Germany were 0.5 times nominal German GDP.

The International Monetary Fund (IMF) describes financial centers as "jurisdictions whose financial sector accounts for a significant – and disproportionate – share of its domestic economy."[9] These jurisdictions are also often called "offshore" financial centers, highlighting the fact that the lion's share of financial interactions of these locations is carried out with nonresidents. In addition, these locations are often said to be "jurisdictions where offshore banks are exempt from a wide range of regulations that are normally imposed on onshore institutions."[10] However, no clear -cut definition of financial centers exists. In 2000, the Financial Stability Forum (FSF) launched an assessment program in order to address regulatory deficits in several financial centers, and drew up a list of countries hosting major financial centers for this purpose, on which this study relies mainly.[11]

Jurisdiction	Aggregate size of branches and subsidiaries of German banks (In billion euros)	Number of parent banks operating in this jurisdiction via branches or subsidiaries
1. Cayman Islands	178.109	10
2. Hong Kong SAR	31.395	7
3. Ireland	85.537	11
4. Luxembourg	387.167	26
5. Malaysia	-	-
6. Mauritius	-	-
7. Netherlands Antilles	-	-
8. Philippines	-	-
9. Singapore	68.725	10
10. Switzerland	24.467	13
11. Channel Islands	19.380	3
12. UK	940.446	25
13. US	300.966	12
Total in financial centers	2,041.114	39
Total without US and UK	799.732	34
Total via branches in financial centers	1,544.126	31
Total via subsidiaries in financial centers	497.018	30

Table 1: German banks' affiliates in jurisdictions with major financial centers
Source: Deutsche Bundesbank and own calculations

NB: This table provides a list of jurisdictions defined as financial centers (see section 2.1), in which German banks had established affiliates (branches or subsidiaries) as of 2006m12. The (-) symbol signifies data not shown here on grounds of confidentiality. The UK Channel Islands comprise Guernsey, the Isle of Man and Jersey.

This paper sheds some light on the role of financial center affiliates by investigating the timeframe from 2006 to 2012. Well after the financial crisis, the aggregate size of German banks' financial center affiliates still exceeded the size of affiliates outside financial centers by a factor of three. In addition, they were about half the aggregate size of their German headquarters. Both figures highlight the importance of financial center affiliates for German banks. Activities in financial centers are mainly carried out via branches, which usually do not have to fulfill local regulatory requirements to the fullest and, therefore, allow greater flexibility regarding the management of balance sheets. This is reflected by the low levels of capitalization. In their loan portfolio, financial center affiliates, and financial center branches in particular (a share of almost 90%), focus on lending to banks and firms in financial centers. However, in doing so, they lend more across borders than to affiliates located outside financial centers. Furthermore, they are highly involved in trading securities, which put particular pressure on their stability during the financial crisis, and required increased support from parent banks. It is also striking that financial center affiliates have to constantly roll over large amounts of short-term debt. During the financial crisis, funding obtained from the parent bank was found to compensate for the difficulties of financial center affiliates, in particular, to tap

7 Lewis (1999)
8 Errico and Musalem (1999)
9 Darbar et al. (2003)
10 Errico and Musalem (1999)
11 FSF (2000)

Jurisdiction	Aggregate size of branches and subsidiaries of German banks (In billion euros)	Number of parent banks operating in this jurisdiction via branches or subsidiaries	Jurisdiction	Aggregate size of branches and subsidiaries of German banks (In billion euros)	Number of parent banks operating in this jurisdiction via branches or subsidiaries
1. Argentina	-	-	26. Netherlands	14.507	10
2. Australia	-	-	27. New Zealand	-	-
3. Austria	140.233	16	28. Norway	-	-
4. Belgium	8.615	6	29. Pakistan	-	-
5. Bosnia and Herzegovina	-	-	30. Poland	14.479	7
6. Brazil	-	-	31. Portugal	6.326	4
7. Bulgaria	-	-	32. Republic of Korea	-	-
8. Canada	6.046	3	33. Romania	-	-
9. Chile	-	-	34. Russian Federation	10.119	5
10. China (mainland)	5.201	7	35. Saudi Arabia	-	-
11. Czech Republic	10.804	4	36. Slovak Republic	-	-
12. Denmark	-	-	37. Slovenia	-	-
13. Estonia	-	-	38. South Africa	-	-
14. Finland	-	-	39. Spain	28.515	11
15. Serbia and Montenegro	-	-	40. Sri Lanka	-	-
16. France	31.140	14	41. Sweden	2.443	5
17. Greece	2.323	5	42. Taiwan	-	-
18. Hungary	15.092	7	43. Thailand	-	-
19. India	-	-	44. Turkey	-	-
20. Indonesia	-	-	45. Ukraine	-	-
21. Iran	-	-	46. United Arab Emirates	-	-
22. Italy	50.290	16	47. Vietnam	-	-
23. Japan	44.621	6	Total outside financial centers	459.480	42
24. Latvia	-	-	Total via branches	195.271	34
25. Lithuania	-	-	Total via subsidiaries	264.209	20

Table 2: German banks' affiliates in nonfinancial center jurisdictions
Source: Deutsche Bundesbank and own calculations

NB: This table lists all jurisdictions not considered to be financial centers (see section 2.1), in which German banks had established foreign affiliates as of 2006m12. The (–) symbol signifies data not shown here on grounds of confidentiality.

short-term wholesale funding markets. Since December 2010, new accounting rules have required banks to report trading portfolio derivatives as part of the balance sheet position "other assets." This dramatically increases the share of these assets in the total balance sheets of financial center branches and likely reveals part of the off-balance sheet risk that these entities have built up.

The remainder of the paper is structured as follows. Section 2 defines the group of financial center jurisdictions and investigates the location and size of German banks' financial center affiliates. Section 3 analyzes in detail the asset structure and the funding sources of branches and subsidiaries in financial centers before, during and after the financial crisis, and compares them with affiliates outside financial centers. In section 4, paths for further research and data limitations with regard to the analysis of risk in financial centers are discussed. Section 5 concludes the findings.

2. How large is the German banks' investment in financial centers?

2.1 Defining financial centers

This paper relies on the FSF's list of financial centers.[12] All "financial centers with significant offshore activities" are included,[13] as well as "major financial centers," which also received the questionnaires for offshore supervisors.[14] Furthermore, in this study, the UK and the US are classified as financial centers. This decision is based on the following considerations. Zoromé, following the initiative of the IMF, developed an identification scheme for offshore financial centers on the basis of macroeconomic characteristics.[15] His results strengthen the IMF's definition, but also call for the UK to be regarded as a financial center. Because of the presence of foreign banks and the dominance of international banking, Cassis sees both the UK and the US as offshore financial centers.[16] For both countries, BIS-consolidated foreign claims are smaller than locational foreign claims, which hints at a strong presence of foreign banks in both locations transacting with other countries.[17] Almost all of the existing German banks' affiliates in the UK are located in London, one of the world's largest financial centers. Similarly, with negligible exceptions, the existing German affiliates in the US are located in New York or Delaware. The US has established the "International Banking Facilities (IBFs)," a booking concept that allows banks to conduct international banking under more favorable tax rules. According to the Federal Reserve Bank of New York (FRBNY), the majority of IBFs are registered in New York, as New York has introduced laws to facilitate the establishment of IBFs and has exempted net income from state and local taxes derived from such facilities.[18] Delaware has become the most popular state in which to host holding companies, under which many foreign banks operate, since it has a very favorable tax and legal environment.

12 FSF (2000)
13 These are Andorra, Anguilla, Antigua, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Cook Islands, Costa Rica, Cyprus, Gibraltar, UK Channel Islands (Guernsey, Isle of Man, Jersey), Lebanon, Liechtenstein, Macau, Malta, Marshall Islands, Mauritius, Monaco, Nauru, Netherlands Antilles, Nevis, Niue, Panama, St Kitts, Saint Lucia, St Vincent, Samoa, Seychelles, Turks and Caicos Islands, and Vanuatu.
14 These include Hong Kong SAR, Ireland, Luxembourg, Malaysia, Singapore and Switzerland.
15 Zoromé (2007)
16 Cassis (2006)
17 Milesi-Ferretti et al. (2010)
18 FRBNY (2007a)

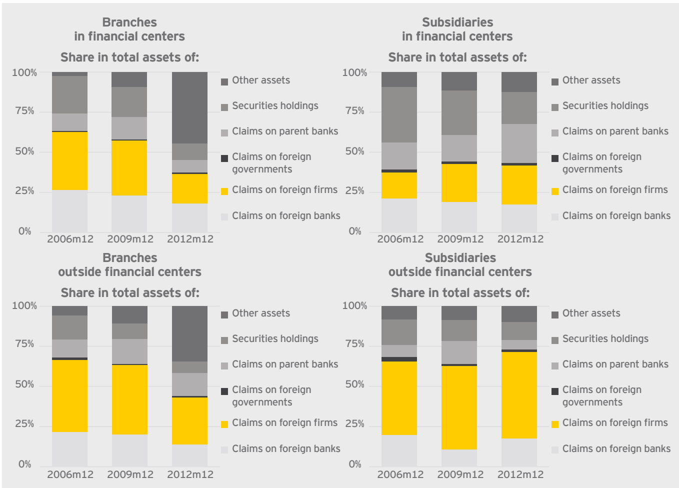

Figure 1: Asset portfolio of German banks' foreign affiliates.
Source: Deutsche Bundesbank and own calculations.

NB: The four panels show the composition of aggregate total assets of German banks' foreign branches and subsidiaries located in financial centers as well as outside those centers. "Claims" refer to accounts receivable, "firms" stands for the nonbank private sector and "foreign" stands for all jurisdictions except Germany.

2.2 Location and size of German banks' financial center affiliates

The data used in this study comes from the reporting of banks to the Deutsche Bundesbank. All banks registered in Germany report, on a monthly basis, balance sheet characteristics of the German part of the bank, as well as of all its foreign affiliates (branches and subsidiaries).[19] Branches usually do not fulfill regulatory capital requirements in their host countries to the fullest, but are consolidated into the balance sheet of the parent bank, whereas subsidiaries represent own legal entities. While subsidiaries are covered individually in the reports, activities of a bank's foreign branches are aggregated by foreign jurisdiction. In addition to the standard balance sheet positions, all of the mentioned entities of the bank file a foreign positions report.[20] This allows for the identification of foreign activities vis-à-vis individual foreign countries and sectors within those countries.

19 Reports of subsidiaries are submitted if the German bank is the majority shareholder.
20 Fiorentino et al. (2010)

Table 1 provides a list of jurisdictions with major financial centers, in which German banks had established foreign affiliates by the end of 2006. Table 2 serves to compare the presence of banks in financial centers with their engagement in other foreign jurisdictions. Both the large number of banks with foreign affiliates in financial centers and the size of these affiliates underline the importance of the centers for German banks, which did not significantly change after the crisis.

By the end of 2006, 39 German banks had established affiliates in 13 financial center jurisdictions, almost as many as across all the other 47 countries (42 German banks). The majority of banks had representations in the financial centers of Luxembourg (26) and the UK (25), while Italy and Austria were the most popular among the nonfinancial center countries (in both countries, 16 banks had established affiliates by December 2006). The aggregate balance sheet size of financial center affiliates is roughly four times the aggregate size of nonfinancial center affiliates (roughly €2t versus €0.5t). Even if the US and the UK are excluded from the list of the 13 financial center countries, the remaining financial center affiliates in 11 countries are, on aggregate, larger than the nonfinancial center affiliates in the other 47 countries. The distribution of total assets between financial center affiliates and nonfinancial center affiliates does not change much between 2006m12 and 2012m12. The same applies to the number of banks active in the two categories of countries.

Individual financial centers host very large affiliates. For example, in the period under review, the overall size of affiliates in the Cayman Islands on its own is already larger than the size of all affiliates in Austria and France taken together. In view of the large balance sheet size of German banks' financial center affiliates, it is of particular importance that parent banks control the risk associated with these affiliates effectively. For this purpose, it is important that supervisors of home and host country cooperate in order to achieve consolidated supervision of the respective bank holding companies.[21]

In financial centers, aggregate balance sheet size of affiliates between branches and subsidiaries is 76% to 24%, whereas the difference in aggregate size is much smaller in nonfinancial center countries. There, branches account for roughly 42% of the aggregate size of all affiliates. German banks thus operate in financial centers mainly through branches, while subsidiaries are more important outside financial centers. The dominance of branches in financial centers means that potential risk is more easily transmitted to the parent bank, as the common balance sheet facilitates transfers between the two entities of the bank holding company. Furthermore, the aggregate size of all parent banks at that time was around €4t. This means that all German parent banks together were only twice as large as their financial center affiliates (€2t, see table 1). This ratio highlights the relevance of financial center affiliates for German multinational banks and the need to control the risk taken by these affiliates.

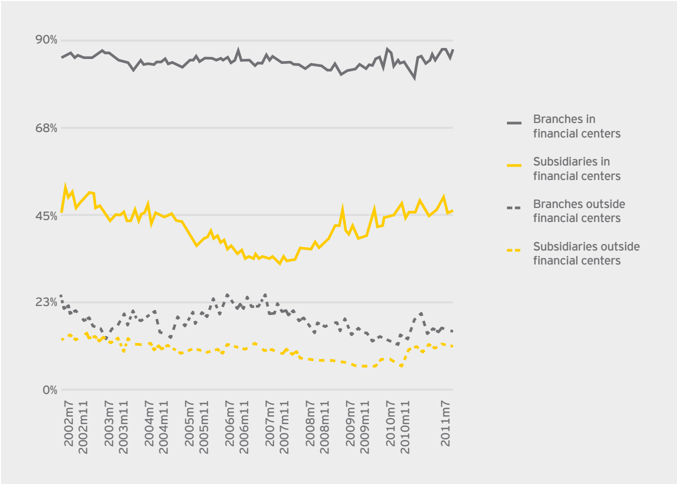

Figure 2: Affiliates' lending to financial centers: lending to banks and firms in financial centers relative to total lending to foreign banks and foreign firms carried out by the different groups of affiliates.
Source: Deutsche Bundesbank/own calculations.

NB: "Firms" stands for the nonbank private sector and "foreign" stands for all counterparties located outside Germany.

21 FSF (2000)

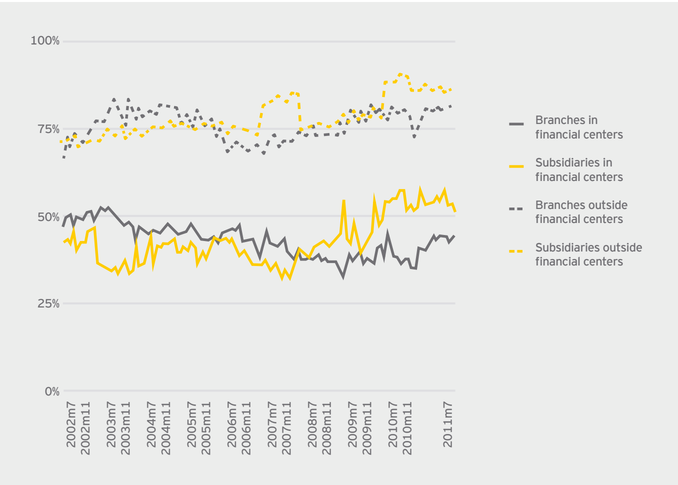

Figure 3: Local lending: the extent to which different groups of affiliates lend locally as a share of their total lending to foreign banks and foreign firms.
Source: Deutsche Bundesbank/own calculations.

NB: "Firms" stands for the nonbank private sector and "foreign" stands for all countries except Germany.

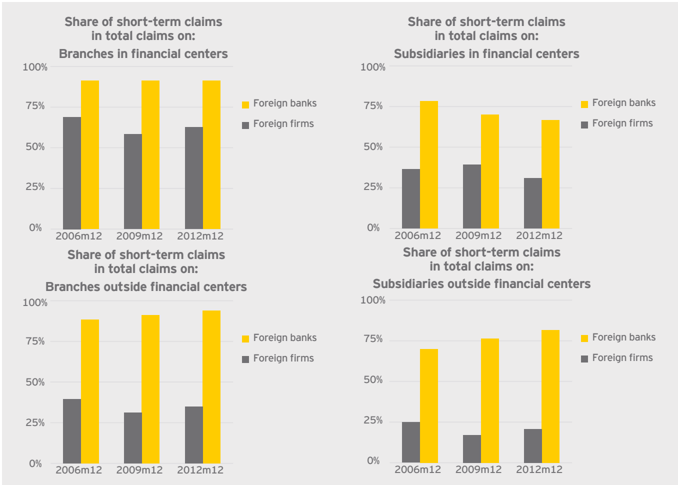

Figure 4: Maturity structure of claims on foreign firms and foreign banks: short-term claims (accounts receivable) are displayed as a share of total claims on foreign banks and firms by affiliates in and outside financial centers.
Source: Deutsche Bundesbank and own calculations.

NB: "Firms" stands for the nonbank private sector and "foreign" refers to counterparties located outside Germany.

3. The role of financial center affiliates for German banks

3.1 Strong focus on financial markets

During the recent financial crisis, the risk associated with some operations in financial markets was largely underestimated. Banks that were highly active in these markets, therefore, had to cope with substantial losses after the collapse of the US subprime market triggered a worldwide financial crisis and negatively affected the functioning of financial markets. In general, however, investments made in financial markets, particularly the trading of securities, are more volatile than, for example, bank lending to the real sector. This section analyzes the extent to which German banks' affiliates in financial centers focus on intermediation in financial markets versus traditional bank lending.

3.1.1 Securities holdings and portfolio trading characterize financial center affiliates

The four panels in figure 1 show a breakdown of German banks' foreign affiliates' assets at three points in time: 2006m12 characterizes the situation before the outbreak of the financial crisis, and 2009m12 captures the structure of balance sheets after the first phase of the crisis and before the beginning of the sovereign debt crisis. 2012m12 stands for the situation found after the financial crisis. All statistics distinguish between branches and subsidiaries, and show aggregates of the two types of affiliates for those located in financial centers and those located elsewhere.

When comparing branches and subsidiaries in financial centers (top row, figure 1) with their equivalents outside financial centers (bottom row, figure 1), it is striking that both types of affiliates in financial centers hold a larger percentage of their total assets as securities. At the end of 2006, the share of securities holdings in total assets of branches in financial centers amounted to 24%, and that of subsidiaries in financial centers to 35%. Their equivalents outside financial centers held 15% and 16%, respectively. This reflects the fact that financial center affiliates are more heavily invested in securities and probably participate, to a greater extent, in trading securities on financial markets. For all categories of affiliates, the share of securities holdings in total assets shrank during the financial crisis, in particular for financial center subsidiaries. This is probably the outcome of sales and a loss in value of many securities related to the collapse of the US subprime market.

The degree to which securities holdings decreased for financial center branches is overshadowed by a change in the accounting rules that was introduced at the end of 2010. Since then, banks have reported trading portfolio derivatives as part of the balance sheet position "other assets." Previously, these derivatives were held off-balance. The dramatic change in balance sheet compositions, in particular for financial center branches, again reflects that an important part of these entities' business is to trade on financial markets. Since this business is mostly short-term and generally more volatile than traditional bank lending, the business model of financial center branches might add to the parent banks' risk of having to provide rapid support during market downturns.

3.1.2 Financial centers mainly lend to each other

Financial center branches' and subsidiaries' assets are clearly focused on financial markets. First, in 2006m12, financial center branches and subsidiaries (top row, figure 1) used only 37% and 16%, respectively, of their balance sheets for lending to foreign firms.[22] In comparison, the lion's share of the balance sheet of branches and subsidiaries outside financial centers (bottom row, figure 1) consisted of lending to foreign firms (almost 50% of the balance sheet in 2006m12).

Second, in the period under review, financial center affiliates were holding a very large share of claims vis-à-vis counterparties located in financial centers (figure 2). Financial center branches directed 85% of their lending to banks and firms in financial centers. Financial center subsidiaries' loan portfolio was, at 30%–50% of lending to financial centers, more balanced between the two categories of destinations. However, the share of loans that they granted to counterparties in financial centers was still significantly higher than the proportion of loans given to financial centers by branches and subsidiaries located outside those centers (both directed only 5%–20% of their total lending to financial centers).

22 The term "firms" is used to describe lending to the foreign nonbank private sector. The term "foreign" applies to all countries but Germany, hence it also applies to the affiliate's country of residence.

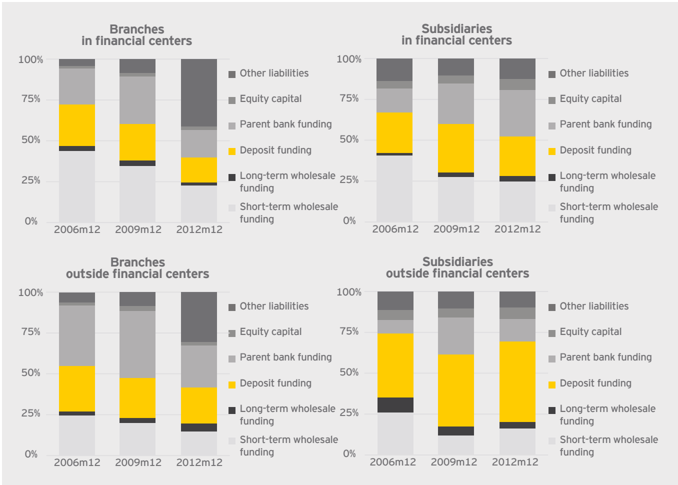

Figure 5: Liability portfolio of German banks' foreign affiliates. The four panels show the composition of aggregate funding sources of German banks' foreign branches and subsidiaries located in and outside financial centers.
Source: Deutsche Bundesbank/own calculations.

NB: "Parent bank funding" refers to liabilities to the German headquarters, "deposit funding" comprises all liabilities to nonbanks, "wholesale funding" consists of funding via foreign banks (i.e., banks outside Germany) and own bonds and notes issued, and "short-term" refers to original maturities of less than one year.

On the one hand, in the event of a shock hitting financial markets first and foremost, a high concentration of assets in these markets, as can be found particularly in the case of financial center branches, most certainly limits the affiliates' ability to compensate possible losses. This, in turn, increases the risk for parent banks of having to step in and provide emergency assistance. On the other hand, this focus on financial markets brings about deeper and more liquid markets with a highly specialized labor force. Parent banks may profit from this, as information on the development of global credit and funding markets is transmitted more quickly to headquarters. Affiliates outside financial centers are in a similar situation. Although they may be more sheltered from shocks hitting financial markets, they are highly exposed to economic slowdowns hitting the nonbank private sector. At the same time, their specialization in lending to the real sector of their country of residence may contribute significantly to the bank's local success.

A large exposure to financial centers, however, could lead to higher balance sheet risk than a comparably large exposure to other economies. This arises from the fact that financial markets are highly interconnected. As mentioned above, the lion's share of lending by financial center affiliates is directed to financial centers (figure 2). Furthermore, as shown in figure 3, the share of lending to local rather than foreign banks and firms is much smaller for financial center affiliates than it is for nonfinancial center affiliates. While financial center subsidiaries have lent 60% locally as of 2012, subsidiaries outside financial centers grant 80%–90% of their total bank and firm loans to local counterparties. Branches in financial centers lend only around 40% locally, while their equivalents outside financial centers focus on local lending to the tune of 80%. A shock hitting one financial center might, therefore, quickly affect other financial centers. This risk of contagion is highlighted by Garratt et al.[23] In contrast, if an affiliate located outside a financial center suffers from a local economic downturn, this will be less likely to negatively impact other affiliates, because those located outside financial centers are mostly exposed to their country of residence. This very concentrated exposure certainly is disadvantageous from a diversification point of view if local problems arise. Still, parent banks then have the chance to isolate and solve the temporary difficulties. By contrast, in the case of a financial center crisis, necessary support measures for affiliates may soon exceed the parent banks' capacity as a result of the high interconnectedness of financial centers.

3.2 Maturity structure of assets and liabilities

3.2.1 Short-term assets dominate financial center affiliates' lending portfolio

Figure 4 shows the share of short-term claims in total claims on banks and firms for all four groups of affiliates between 2006 and 2012. Both branches and subsidiaries in financial centers (top panels) hold relatively more short-term claims on foreign firms than their equivalents outside financial centers (bottom panels). For branches, this difference is particularly striking. While branches outside financial centers grant only around 35% of their loans to foreign firms on a short-term basis, financial center branches lend roughly 60%–70% on a short-term basis. This higher level of short-term lending reflects once more the high interaction between financial centers.

23 Garratt et al. (2011)

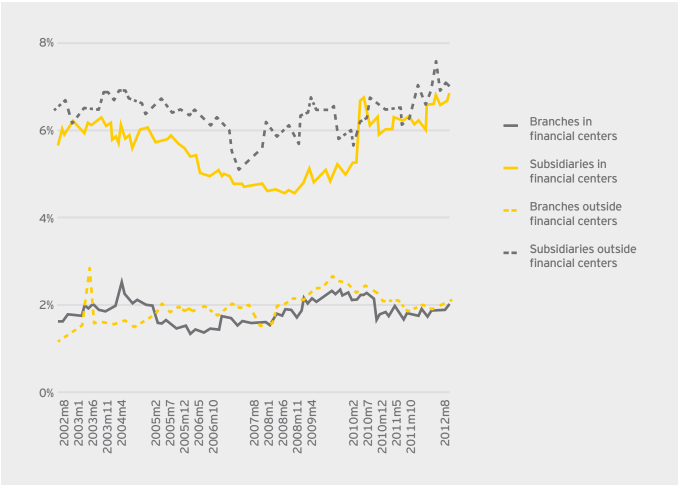

Figure 6: Capitalization: ratios of aggregate equity capital to total liabilities of German banks' foreign affiliates in and outside financial centers
Source: Deutsche Bundesbank and own calculations.

Branches and subsidiaries in financial centers probably lend more to financial firms, such as hedge funds or investment vehicles, which engage more in short-term assets and securities trading activities and less in longer-term investments, for example, plant and equipment. These activities, in general, increase the default risk of loans, particularly in a financial crisis.

However, due to the shorter-term structure, balance sheets of branches and subsidiaries in financial centers seem to be more liquid. This likely increases their potential to buffer shocks to their portfolio, thus reducing the risk of transmitting disruptions to the parent banks. After the outbreak of the financial crisis, branches in financial centers, whose balance sheets were the most liquid before the crisis, seem to have used this buffer most often. They were at the forefront of letting short-term loans to foreign firms expire, which led to a drop in the share of short -term lending to foreign firms by 12 percentage points.

When comparing the situations before and after the financial crisis (2006m12 and 2012m12), the maturity structure of loans granted to foreign firms lengthened slightly across all four groups of affiliates. Compared with foreign banks, financial center affiliates (top panels, figure 4) reduced or kept stable their

short-term claims relative to longer-term claims.
In contrast, affiliates outside financial centers (bottom panels, figure 4) increased slightly the share of loans to banks that are granted on a short-term basis. A possible explanation for this development could be that, in the light of increasing opacity of risk incorporated in many banks' balance sheets, branches and subsidiaries outside financial centers had been downsizing their longer-term investments in other banks, instead concentrating on their core business — longer-term lending to firms. In addition, they could have tried to increase the liquidity of their asset portfolios after the financial crisis had rendered the economic environment less predictable. Assuming that investments in other banks have become more risky since the financial crisis, owing to remaining toxic assets in many banks' balance sheets, then it may be that affiliates outside financial centers have recently downsized the risk of their lending portfolio by shortening the maturity of loans to foreign banks.

3.2.2 Large rollover risk in financial centers

Financial center affiliates not only issue more short-term loans relatively, but also finance their business to a larger extent on short-term wholesale markets. The liability structure of all four groups of affiliates is depicted in figure 5 as of 2006m12, 2009m12 and 2012m12. Branches in financial centers use short-term wholesale funding most often. This includes interbank funding with an original maturity of less than one year as well as own bonds and notes issued. Before the financial crisis, this group raised 43% of its total funding via short-term wholesale markets, compared with 25% obtained by branches outside financial centers. When located in financial centers, subsidiaries used short-term wholesale funding to a similar extent as branches, but they reduced or had to reduce their funding via this market at an earlier point in the financial crisis. By the end of 2012, both types of financial center affiliates had raised 25% of their total funding on short-term wholesale markets.

However, the development of the branches' liability portfolios is again overshadowed by the change in the accounting rules implemented at the end of 2010. In the liability composition as of 2012m12, liabilities arising from trading portfolio derivatives are reported as "other liabilities." This increases the share of this funding source in total liabilities and reduces the share of short-term wholesale funding. Yet, as most of these newly reported liabilities are probably of a short-term nature, the dominance of short-term liabilities of financial center branches is still striking. In total, over 50% of the liabilities of financial center branches were likely short-term at 2012m12.

Subsidiaries (and branches to a certain extent) outside financial centers can rely much more than their financial center equivalents on deposit funding, i.e., on funding obtained from nonbanks. This funding source adds stability to the liability portfolio of nonfinancial center affiliates, as it is less volatile and generally longer-term than wholesale funding. During the financial crisis, the share of deposits in total liabilities remained fairly stable for all types of affiliates except branches in financial centers. The higher degree of interaction with financial firms might explain the relatively large decline in deposits as a share of total liabilities. It has to be kept in mind that at the time, counterparties, such as special purpose vehicles, were realizing dramatic losses due to the collapse of the subprime market. Therefore, they may have withdrawn their deposits from banks. And again, the change in accounting rules might have also impacted the variation in deposits relative to total liabilities.

The comparably large reliance on short-term funding by affiliates located in financial centers versus outside financial centers creates greater exposure to rollover risk. When providers of short-term funds, such as other banks, lose confidence in market participants, which is what occurred during the financial crisis, then financial center affiliates will be hit sooner and more strongly than other affiliates because of the maturity structure of their liabilities. In a systemic crisis, it has proved to be advantageous if a bank has access to longer-term deposit funding. Many banks have, therefore, aimed at increasing the share of funding from nonbanks in total liabilities. Parent banks holding affiliates that rely largely on short-term funding have to be prepared to compensate possible shortfalls during a funding crisis.

3.3 Capitalization

3.3.1 Branches in general are very weakly capitalized

As can be seen in figure 5, equity capital represents only a small fraction of total liabilities of all groups of affiliates.

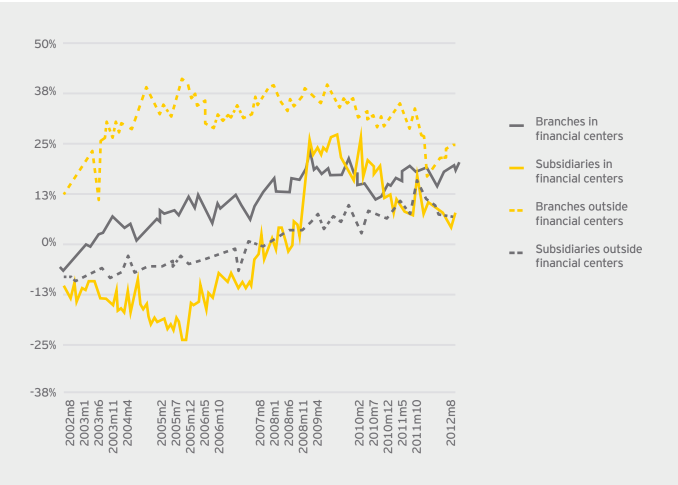

Figure 7: Net borrowing from the parent bank is shown relative to total foreign assets of affiliates.
Source: Deutsche Bundesbank and own calculations.

NB: Net borrowing is calculated as aggregate liabilities (accounts payable) of affiliates to their German parent banks minus aggregate claims (accounts receivable) on parent banks. For branches, this position is approximated by liabilities and claims on the German banking sector, as branches interact mostly with their parent banks (see Frey and Kerl, 2015).

Subsidiaries are generally better capitalized than branches, both in and outside financial centers. Figure 6 traces the development over time of the affiliates' equity capital to total liabilities in more detail. The large difference in the level of capitalization between branches and subsidiaries is striking. While, in the period under review, branches were having only 1%–2.5% of equity capital relative to total liabilities, subsidiaries were holding roughly 4%–7% of equity capital. This reflects the obligation of subsidiaries to fulfill local regulatory rules, including minimum capital requirements. However, their stock of equity capital is likely to include buffers. In comparison, German parent banks were holding on aggregate roughly 4% of equity capital relative to total liabilities. Being own legal bank entities themselves, subsidiaries have therefore been rather well-capitalized. Branches, by contrast, would have been rather weakly capitalized if they did not have unconditional access to the parent banks' resources.

When capitalization is low, affiliates are unable to compensate large losses by themselves. Branches are, therefore, most likely to need support from the parent bank, particularly when they are located in financial centers. During the financial crisis, owing to their exposure to the disruptions on financial markets, banks located in financial centers registered very large defaults on loans and massive depreciations of securities. Branches in financial centers probably experienced the largest losses of all groups of affiliates, and were at the same time the least sufficiently capitalized group. To avoid an erosion of their capital base, many foreign affiliates of multinational bank holding companies most likely tapped the internal capital market organized by their parent banks.

3.3.2 Financial center subsidiaries are increasingly well-capitalized

According to figure 6, financial center branches and subsidiaries dispose of, in the period under review, less equity capital relative to total liabilities than their equivalents outside financial centers. While the difference between the two types of branches amounts to only half a percentage point on average over time, financial center subsidiaries had an equity capital ratio of roughly one to one-and-a-half percentage points below the ratio of subsidiaries outside financial centers. However, from mid-2009 to the end of 2012, financial center subsidiaries have increased their aggregate capital ratio to almost the level of nonfinancial center subsidiaries. Both then held between 6% and 7% of equity capital relative to total liabilities. This adjustment may be driven by the increasing need for capital buffers in connection with impending losses in the sovereign debt crisis. Branches, by contrast, slightly reduced their capital buffers during the same time, although the changes occurred on a much smaller scale.

Banking regulation has attached even greater significance to capital ratios since the financial crisis. US regulators, for instance, have adopted a stricter leverage rule for bank holding companies above a certain size. This entails insured depository institutions, such as subsidiaries of these bank holding companies being considered "well-capitalized" only if they have a capital ratio (also called "leverage ratio") of around 8%.[24] The ratio might be slightly lower if IFRS is used as the reporting standard rather than US GAAP, on which this figure is based.[25]

24 Board of Governors of the Federal Reserve System (BGFRS) (2014)
25 Most branches of foreign banks in the US are not insured depository institutions. FRBNY

3.4 Reliance on funding provided by the parent bank

The lower level of capitalization of branches compared with subsidiaries, and to a lesser degree their use of deposit funding suggest that they rely more on parent bank funding. The liability portfolio compositions in figure 5 demonstrate this. Irrespective of their country of residence, German banks' foreign branches generally use more parent bank funding on a regular basis (accounts payable to the parent bank) than subsidiaries.[26] Before the crisis (in 2006m12), branches in financial centers relied on parent bank funding to an extent of 21%, while subsidiaries in financial centers only received about 14% of total funding from headquarters (see top row, figure 5). The difference between branches and subsidiaries is even more dramatic for entities located outside financial centers (bottom row, figure 5). These branches used parent bank funding for 37% of their business in 2006m12, while subsidiaries outside financial centers only received 9% of their funding from parent banks (bottom row, figure 5). A larger reliance on parent bank funding generally increases the responsibility for parent banks to provide liquidity assistance on a regular basis.

3.4.1 Parent bank funding replaced short-term wholesale funding in the crisis

In the financial crisis, all four groups of affiliates increased the share of parent bank funding in total liabilities. This increase mirrors the decline in short-term wholesale funding during the first stage of the financial crisis. This enforces the impression that during the crisis parent bank funding was used to compensate for the decline in interbank and market funding, not only by financial center affiliates. The largest increase in parent bank funding in total liabilities occurred for subsidiaries outside financial centers (+14 percentage points), which had relied the least on parent bank funding before the crisis. However, funding via parent banks decreased for these subsidiaries between 2009m12 and 2012m12, and instead they returned to a higher degree of short-term wholesale funding.

Subsidiaries in financial centers continued to expand their borrowing from their parent banks between 2009m12 and 2012m12 as well, but could not return to higher levels of market funding, unlike subsidiaries outside financial centers. Those subsidiaries may have been more deeply involved in the sovereign debt market, which was impacted by the subsequent stage of the crisis when banks incurred extensive write-downs on sovereign bonds from European peripheral states. This development suggests that a high level of borrowing from the parent bank on a regular basis does not increase the risk for parent banks stemming from the affiliates' balance sheets per se. During the crisis, affiliates with the most difficulties in keeping up short-term wholesale funding increased their reliance on parent bank funding as a share of total liabilities the most. This development was not solely linked to affiliates residing in financial centers. These difficulties arose during the financial crisis because of increasing uncertainty about the riskiness of the affiliates' asset portfolio as well as the worsening economic outlook.

3.4.2 Net support by parent banks in the crisis was greatest for financial center affiliates

As mentioned above, funds regularly flow between parent banks and affiliates, not just in times of crisis. Liquidity may be shifted to affiliates for funding purposes, but may also be withdrawn from affiliates by the parent bank in order to prioritize other activities, such as domestic lending. The net liabilities of affiliates to the parent bank, therefore, provide another insight into the role of the different groups of affiliates within the banking organization. Figure 7 shows this net position, i.e., the aggregate net borrowing of affiliates from the parent bank, scaled by aggregate total foreign assets of the affiliates (hence, by the volume of the business that these affiliates carry out abroad).

Before 2007, foreign subsidiaries of German banks, both in and outside financial centers, were net providers of funds to their parent banks. This means that they were used as net funding sources by parent banks, possibly owing to their greater ability to raise funds locally compared with branches. Subsidiaries, being own legal entities, and often formerly stand-alone banks, usually have a greater network in place to attract deposits. This is reflected in their negative net borrowing position to parent banks. However, the situation changed in the first stage of the financial crisis. After mid-2007, subsidiaries were net borrowers

(2007b). Therefore, this rule will most likely be applied only to the banks' subsidiaries, for which deposit insurance is available.

26 While subsidiaries report their assets and liabilities to the parent bank explicitly, it has to be approximated for branches. Frey and Kerl (2015) find that branches' claims and liabilities on the German banking sector (excluding the central bank) provide a fairly good approximation for the position of the parent bank, as branches rarely interact with domestic banks other than their own headquarters. This approach is implemented here.

from their parent banks, as were branches. Compared with net borrowing of nonfinancial center affiliates, net reliance of financial center affiliates on their parent banks increased more strongly after the collapse of the subprime market in mid-2007 and again with the bankruptcy of Lehman Brothers in September 2008. This development was probably due to losses that financial center affiliates had to realize, as defaults and impairments had to be recognized in relation to receivables and securities in the aftermath of the crisis events.

Net borrowing from the parent bank relative to total foreign assets seems to have experienced a downward trend after 2008. At that time, German banks may have started to repatriate funds in order to stabilize domestic lending after their own access to market funding became more limited.[27] Branches in financial centers needed increasing net support again starting in mid-2010. This also may signal deeper involvement of financial center branches in the trading of sovereign debt. Some of these investments had possibly turned risky, particularly with some European peripheral states struggling against insolvency, as they were unable to shoulder the support of their over-indebted banking systems.

Hence, whereas before the financial crisis, branches and subsidiaries outside financial centers had relied more on parent bank funding than their respective equivalents in financial centers, in the course of the crisis, the increase in net borrowing from headquarters was larger for financial center affiliates. This possibly reflects the higher risk that was incorporated in their balance sheets, which materialized with the disruptions on financial markets.

4. Paths for further research and data limitations

This paper provides a first insight into the relevance of financial centers to German multinational banks before, during and shortly after the financial crisis, and potential risk that is associated with affiliates located in these centers. Banks shift business, such as the intermediation of international bank lending to financial centers, if this appears to be more profitable than conducting the same business elsewhere within the bank holding company.

New regulatory approaches, which are being implemented within the framework of the Basel III accords, aim at strengthening the equity capital base of banks and put new limits to the growth of multinational bank holding companies at low levels of equity. It is, however, unclear how banks will react to these new rules. Regulators are struggling with the implementation of uniform regulation across country borders to create a "level playing field." This opens up leeway for jurisdictions that refrain from implementing tighter restrictions on financial transactions. Some offshore financial centers will continue to provide or will enlarge their platforms where regulation is less strict, so that they will attract bank business from more tightly regulated countries.

It is, therefore, possible that the home countries of multinational banks will experience a further loss of control over parts of their banks' balance sheets despite tighter regulation. As discussed in this paper, financial center affiliates of multinational banks can increase much more in size compared with their home institutions. This development will probably continue as restrictions on home institutions tighten. Further research should, therefore, analyze the extent to which the size of financial center affiliates actually contributes to the spillover of financial stress to parent banks.

For this purpose, it is advantageous to model in more detail the relationship between parent banks and their financial center affiliates, as well as between financial center affiliates and nonfinancial center affiliates. For German banks, data reports available since June 2010 provide further insight into claims and liabilities of German banks' foreign affiliates compared with each other. As longer time series become available, an analysis of this data can refine an assessment on how stress can be transmitted within banking groups and to other banks. Models that assess the risk of contagion within and between networks can provide useful tools. Garratt et al., for example, conduct such an analysis on the country level.[28]

As is the case with other studies on the role of financial centers, a very detailed balance sheet data reported to bank supervisors do not reveal the extent to which banks make off-balance sheet investments.[29] A change in accounting rules implemented in Germany in December 2010 offers more insights into this off-balance sheet activity by requiring the reporting of trading

27 Kerl (2015)

28 Garratt et al. (2011)

29 Lane and Milesi-Ferretti (2010)

portfolio derivatives. For branches in financial centers, this has changed the composition of assets dramatically, as this position accounted for roughly 40% of the balance sheet after the change of rules (see section 3.1).

However, the lack of data on activities in financial centers likely leads to an underestimation of the risk that parent banks ultimately have to bear.[30] In particular, complex unreported ownership structures of financial firms, including hedge funds and special purpose vehicles, make it even harder to assess the size and the riskiness of banks' investments in financial centers. Therefore, more data on relationships between banks and nonbanks should be collected and analyzed by supervisors. Arteta et al., for instance, assemble data on ownership and sizes of special purpose vehicles that had invested in the US subprime market prior to its collapse.[31]

They find that the buildup of too much risk by these vehicles was possible because of manager agency problems but also because of the lack of government control of ownership structures. This path of research should be extended in order to assess more accurately the risk incorporated in financial center investments.

5. Conclusion

Financial centers are often accused of encouraging tax fraud and money laundering,[32] but many of them have adopted stricter legislative frameworks in their financial systems in order to address these concerns.[33] Nevertheless, these countries still offer an advantageous tax and legal environment for financial transactions.[34] Their importance for global banking has continued to increase in terms of the number of existing financial centers and the volume of financial transactions intermediated. This study, therefore, analyzes the role played by financial center affiliates for German multinational banks and provides first steps towards assessing the risk for parent banks incorporated in these affiliates' balance sheets.

Financial center affiliates of German banks were, even well after the financial crisis, four times as large as their affiliates located elsewhere. In addition, the German parent banks of these affiliates were, on aggregate, only twice as large as the financial center affiliates themselves. Because of their large size and their particularly strong interactions, financial center affiliates are likely to transmit distress to their parent banks whenever disruptions to financial markets occur. Furthermore, German banks operate in financial centers mainly through branches that are consolidated into the parent banks' balance sheets. This promotes the transmission of shocks. When several financial center affiliates need support from the parent bank at the same time, the latter may quickly become overtaxed by the support needed, particularly when taking into account the large size of financial center affiliates.

Judging from the analysis before and after the financial crisis, branches both in and outside financial centers would be very weakly capitalized if they were not consolidated into the parent banks' balance sheets. On the contrary, after the financial crisis, financial center subsidiaries increased capitalization almost to the level of nonfinancial center subsidiaries, and were subsequently better capitalized than the aggregate of their parent banks. This development reduced the risk incorporated in their balance sheets.

When the recent crisis unfolded, parent bank funding was used by all types of affiliates to compensate for a loss in short-term wholesale funding. Only subsidiaries outside financial centers, up to the end of 2012, managed to return to their pre-crisis level of market funding. In general, affiliates in financial centers, particularly branches, constantly need to roll over large amounts of short-term debt. This increases the risk that parent banks may have to provide financial assistance during downturns on funding markets. Therefore, it was to be expected that net borrowing of financial center affiliates from their parent banks would increase more sharply after the collapse of the subprime market in mid-2007.

With the experiences of the financial crisis, regulators in advanced economies are tightening regulation for large banks and are setting limits to their size when weakly capitalized. The introduction of leverage ratios, for example, compares equity capital with total assets rather than only with risk -weighted assets. In case of a bank defaulting, this is expected to reduce the problem of institutions being "too big to fail."

30 Darbar (2003)
31 Arteta et al. (2013)
32 Rose and Spiegel (2007)
33 Williams et al. (2005)
34 Lane and Milesi-Ferretti (2010)

The new rules may, however, encourage shifting business off the balance sheet. Furthermore, the largely unregulated hedge fund industry or other market participants offering bank-type services can pick up investments that are no longer profitable for banks. Financial centers have hosted mostly banking activity, but the fund industry has made some ground.[35] As a result of lower tax burdens and their platform character within the global banking network, financial centers represent an attractive place not only for banks but also for hedge funds and other financial firms. For example, in the early 2000s, the hedge fund industry grew in the Cayman Islands by 30% per year.[36]

The relevance of financial centers as international financial platforms is, therefore, likely to increase in the near future. In order to avoid excessive risk taking in these countries, supervisors should aim at increasing the transparency of local activities and work closely together with regulators of the international banks' home countries. Tax regimes and supervisory standards should be further harmonized.[37] Effective supervision of bank holding companies on a consolidated level may help to avoid the buildup of risk exposures, which could threaten the solvency of international banks and ultimately endanger global financial stability.

35 Milesi-Ferretti et al. (2010)
36 McGuire (2005)
37 FSF (2000)

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