

Foreign competition and disintermediation: no threat to the German banking system? *

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1. Motivation

The German banking system is one of the prototypes of universal banking structures. German banks can hold equity stakes in non-financial firms, German bankers sit on the boards of large enterprises, and banks cast proxy votes on behalf of their clients. At the same time, the German banking sector is characterized by comparatively low market shares of foreign commercial banks, and financial intermediation has not yet significantly shifted away from banks. This is despite the relatively large degree of openness of the German financial system and the global trend towards disintermediation, which is, in turn, driven by deregulation and technological change.

At first sight, these stylized facts seem to support the view that universal banking creates implicit entry barriers and thus constrains the contestability of markets (Rajan 1998, Boot and Thakor 1997). Aoki and Dinç (1997), in fact, argue that competition from alternative sources of financing is likely to strengthen relational financing characteristics of universal banking systems. The issue is thus whether the observed features of the German banking system are due to the presence of universal banks or whether alternative explanations can be found.

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The literature so far has provided mixed evidence on structural changes in Germany's financial markets. While Borio (1995) and Calomiris (1995) argue that deregulation since the early 1990s has led to a process of securitization, Allen and Gale (1995), Domanski (1997), Schmidt, Hackethal and Tyrell (1998) find that German capital markets remain much less developed as compared to the US with no clear disintermediation trend. According to Dziobek and Garrett (1998), this is largely the result of universal banking.

Another strand of the literature has been concerned with the role of universal banks in overcoming information asymmetries. Edwards and Fischer (1994) conclude that relationship-banking creates only little information advantages. Small market shares of foreign banks would thus have to be explained by factors other than close customer contacts of the incumbents. Yet, other studies have found evidence for relationship lending and thus reduced information costs of the incumbents (Elsas and Krahen 1998, Harhoff and Körting 1997, Gorton and Schmid 1996, Schmid 1996). However, it is not necessarily clear that relationship lending is a specific feature of large (universal) banks but rather characterizes savings banks and credit co-operatives as well (Küppers 1999).

Despite the large amount of research on the German financial system, issues related to the competition between domestic and foreign banks as well as the determinants of foreign banks' activities in Germany have received only little attention in the literature. The purpose of this paper is to partly close this gap. We start by giving an overview of the theoretical literature and derive testable implications (Section 2). Section 3 provides evidence on the market shares of foreign banks in Germany and in the US, in particular with regard to the determinants of credit supply of domestic versus foreign banks. Section 4 summarizes the main findings. Whereas universal banking seems not to have impeded market access into investment banking, the retail market is dominated by domestic financial institutions, mainly savings and cooperative banks. As these banks do not hold equity stakes in non-financial firms, universal banking per se cannot serve as an explanation for this dominance of domestic banks. Rather, differences in information costs between domestic and foreign banks provide an alternative explanation. Also, savings banks have access to relatively low-cost funds and therefore hold a comparative advantage over competitors.

2. Universal banking, foreign competition and disintermediation

This section summarizes theoretical contributions which help us to gauge the likely effects of deregulation and of the on-going process of disintermediation on (universal) banking systems. Hereby, we interpret deregulation as the abolition of regulatory restrictions to the provision of certain financial services as well as to the entry of foreign financial institutions. Disintermediation, in contrast, is considered as a process driven mainly by changes in preferences and in technology. This process is not exogenous as deregulation, through its impact on the variety and on the prices of financial services, is likely to foster changes in preferences and in technology. A clearcut distinction between deregulation and disintermediation is thus not possible. We start with a simple illustrative model of a banking sector in which domestic and foreign banks compete in the markets for loans granted to domestic and foreign clients. In a second step, we take specific account of the fact that universal banking systems are characterized by close contacts between banks and their customers.

2.1. *Foreign competition and banking*

To study the impact of increased competition through the entry of foreign banks, we use a model with domestic and foreign banks competing on the markets for loans to domestic and foreign clients. We assume a Cournot-type framework, where n identical domestic and m identical foreign banks maximize their profits, given the loan supply of all other banks.¹ The intermediation process between savers and

¹ The assumption of Cournot competition in banking can be questioned because banks typically compete in prices rather than quantities. Nevertheless, Neven and Roeller (1999) show empirically that the assumption of competition in quantities describes the actual situation for the European banking industry relatively well. Yet, they reject Cournot competition in favor of an industry structure characterized by cartel-like behavior. Helpman and Krugman (1985) defend the assumption of Cournot competition although competition in prices might seem more sensible. Assuming Bertrand competition, in contrast, and taking the interaction of loans supply and deposit demand decisions into account substantially complicate the analysis (see, e.g., Yanelle 1997). Chiappori, Perez-Castrillo and Verdier (1995), Dell'Ariccia (1998), Economides, Hubbard and Palia (1996), or Rajan (1998) model price competition in the banking industry, using spatial competition models of product differentiation.

borrowers is presumed to be costly, yet banks provide intermediary services at lower costs than other market participants. These savings in transaction costs can be realized as a result of the information on loan applicants that banks acquire through deposit services or as a result of diversification (see Diamond 1984 and Nakamura 1993).

Domestic banks $i=1, \dots, n$ and foreign banks $j=1, \dots, m$ are assumed to provide two types of assets, namely loans to domestic and foreign clients, (L_{iD}, L_{iF}) and (L_{jD}, L_{jF}) , and they finance their activities through deposits (D_i, D_j) and equity (E_i, E_j) . The balance sheet structure of the representative domestic and foreign bank can thus be written as

$$\begin{array}{llll} (1) & L_i = D_i + E_i & \text{with} & L_i = L_{iD} + L_{iF} \\ (2) & L_j = D_j + E_j & \text{with} & L_j = L_{jD} + L_{jF}. \end{array}$$

Denoting the shares of deposits in total assets for domestic and foreign banks by (α_i, α_j) , deposits and equity can be rewritten as

$$\begin{array}{llll} (3) & D_i = \alpha_i L_i & \text{and} & E_i = L_i - \alpha_i L_i \\ (4) & D_j = \alpha_j L_j & \text{and} & E_j = L_j - \alpha_j L_j. \end{array}$$

Banks' revenues are determined by the interest received on loans (r_{LD}, r_{LF}) . Costs comprise variable costs of making loans, i.e. (c_{iLD}, c_{iLF}) for domestic and (c_{jLD}, c_{jLF}) for foreign banks, as well as the interest (r_D) paid on deposits and the opportunity costs (ρ_i, ρ_j) of holding equity. Finally, there are fixed costs of market entry (F_i, F_j) . The profit function for a representative domestic bank can thus be written as

$$(5) \pi_i = (r_{LD} - c_{iLD})L_{iD} + (r_{LF} - c_{iLF})L_{iF} - r_D \alpha_i L_i - \rho_i (L_i - \alpha_i L_i) - F_i.$$

Equivalently, the profit function for a representative foreign bank is given by

$$(6) \pi_j = (r_{LD} - c_{jLD})L_{jD} + (r_{LF} - c_{jLF})L_{jF} - r_D \alpha_j L_j - \rho_j (L_j - \alpha_j L_j) - F_j.$$

To simplify the analysis, we abstract from explicitly modeling information asymmetries or the impact of increased competition on the monitoring incentives of the incumbent financial institutions.² Yet, we interpret the variable operating costs from handling loan applications in terms of information costs. The markets for domestic

² For a general discussion of the effects of increased competition in banking on interest rates, welfare, and bank monitoring see Aizenman (1998), Besanko and Thakor (1992) or Gehrig (1998).

and foreign clients are assumed to represent two separable market segments. To simplify the exposition, we assume that domestic and foreign banks are facing identical conditions on the deposit side and that they take the deposit rate as exogenous. All lenders and borrowers in the respective markets are identical, such that individual demand and supply curves can be added up.

The optimal choice of loan supply and deposit demand by domestic and foreign banks is constrained by the market demand for loans from domestic and foreign firms and by the market supply of deposits. Loans to domestic and foreign clients, respectively, are assumed to represent two homogenous goods, i.e. loans to domestic (foreign) firms by domestic (foreign) banks are perfect substitutes. Assuming linear market demand functions, we can thus write

$$(7a) \quad nL_{iD} + mL_{jD} = L_D(r_{LD}) = d_1 - d_2 r_{LD} + d_3 r_B$$

$$(7b) \quad nL_{iF} + mL_{jF} = L_F(r_{LF}) = f_1 - f_2 r_{LF} + f_3 r_B$$

$$(7c) \quad nD_i + mD_j = D(r_D, r_B), \text{ where } D'(r_D) > 0 \text{ and } D'(r_B) < 0$$

where $d_i, f_i > 0$ with $i=1, 2, 3$ represent the determinants of domestic and foreign loan demand. The bond rate (r_B) represents the price of an alternative source to finance firm operations. The inverse loan demand functions are

$$(8a) \quad r_{LD} = \frac{d_1 + d_3 r_B - L_D}{d_2}$$

$$(8b) \quad r_{LF} = \frac{f_1 + f_3 r_B - L_F}{f_2}$$

Banks choose lending to domestic and foreign clients as well as the structure of their liabilities to maximize profits. From the optimal supply of loans in the two market segments, the optimal scale of activities and the structure of the banks' assets can be derived. In what follows, we abstract from feedback effects between the optimal values for α_i and L_{iD} , and make the simplifying separation assumption that

the cross derivatives are zero, i.e. $\frac{\partial^2 \pi}{\partial L_i \partial \alpha} = \frac{\partial^2 \pi}{\partial \alpha \partial L_i} = 0$. We therefore

assume that the scale of operations can be determined independently from the optimum balance sheet structure, and *vice versa* (see Balten-

sperger and Milde 1987, and Chiang 1984). Based on (5), the first order conditions for the profit maximum of domestic bank i are thus given by

$$(9a) \quad \frac{\partial \pi_i}{\partial L_{iD}} = -\frac{1}{d_2} L_{iD} + r_{LD} - c_{i,LD} - r_{LD} \alpha_i - \rho_i (1 - \alpha_i) = 0$$

$$(9b) \quad \frac{\partial \pi_i}{\partial L_{iF}} = -\frac{1}{f_2} L_{iF} + r_{LF} - c_{i,LF} - r_D \alpha_i - \rho_i (1 - \alpha_i) = 0$$

$$(9c) \quad \frac{\partial \pi_i}{\partial \alpha_i} = -r_D L_i + \rho_i L_i = 0.$$

Taking the inverse demand functions (8a) and (8b) into account, the first order conditions can be rewritten as

$$(9a') \quad \frac{\partial \pi_i}{\partial L_{iD}} = -\frac{1}{d_2} L_{iD} + \frac{d_1 + d_3 r_B - L_D}{d_2} - c_{i,LD} - r_D \alpha_i - \rho_i (1 - \alpha_i) = 0$$

$$(9b') \quad \frac{\partial \pi_i}{\partial L_{iF}} = -\frac{1}{f_2} L_{iF} + \frac{f_1 + f_3 r_B - L_F}{f_2} - c_{i,LF} - r_D \alpha_i - \rho_i (1 - \alpha_i) = 0$$

$$(9c') \quad \frac{\partial \pi_i}{\partial \alpha_i} = -r_D L_i + \rho_i L_i = 0.$$

Based on (9a') and (9b'), which are identical for all i domestic banks, we can derive bank i 's reaction functions, i.e. the optimal loan supply of bank i in the two market segments as a function of the loan supply of the foreign bank j

$$(10a) \quad L_{iD}^*(L_{jD}) = \frac{1}{1+n} \{d_1 + d_3 r_B - L_{jD} m - d_2 [c_{i,LD} + r_D \alpha_i + \rho_i (1 - \alpha_i)]\}$$

$$(10b) \quad L_{iF}^*(L_{jF}) = \frac{1}{1+n} \{f_1 + f_3 r_B - L_{jF} m - f_2 [c_{i,LF} + r_D \alpha_i + \rho_i (1 - \alpha_i)]\}$$

Substituting the foreign banks' reaction functions [$L_{jD}^*(L_{iD})$, $L_{jF}^*(L_{iF})$] into (10a) and (10b) respectively, we can derive the optimal loan supply for a representative domestic bank

$$(11a) \quad L_{iD}^* (L_{jD}^*) = \frac{1}{1+m+n} \{d_1 + d_3 r_B + d_2 m [c_{j,LD} + r_D \alpha_j + \rho_j (1 - \alpha_j)]\} \\ - \frac{1}{1+m+n} \{d_2 (1+m) [c_{i,LD} + r_D \alpha_i + \rho_i (1 - \alpha_i)]\}$$

$$(11b) \quad L_{iF}^* (L_{jF}^*) = \frac{1}{1+m+n} \{f_1 + f_3 r_B + f_2 m [c_{j,LF} + r_D \alpha_j + \rho_j (1 - \alpha_j)]\} \\ - \frac{1}{1+m+n} \{f_2 (1+m) [c_{i,LF} + r_D \alpha_i + \rho_i (1 - \alpha_i)]\}.$$

As can be seen from (11a) and (11b), assumptions on the relative cost structures between domestic and foreign banks have to be made in order to determine whether banks service a given market segment. In addition to operating costs, differences in the opportunity costs of raising equity and thus in the structure of banks' liabilities affect relative market shares.³ Looking at (11b) shows that domestic (foreign) banks are less likely to provide loans to foreign (domestic) clients the larger their comparative disadvantage of supplying these loans.

Based on comparative static analysis, we can determine the effect of an increase in the costs on the market shares of domestic and foreign bank, which is given by

$$(12) \quad \varepsilon_i = \frac{nL_{iD}^*}{nL_{iD}^* + mL_{jD}^*}$$

and thus

$$(13a) \quad \frac{\partial \varepsilon_i}{\partial c_{i,LD}} = \frac{1}{1+m+n} \frac{[-d_2 nm(1+m)L_{jD}^* - d_2 n^2 mL_{iD}^*]}{(nL_{iD}^* + mL_{jD}^*)^2} < 0$$

$$(13b) \quad \frac{\partial \varepsilon_i}{\partial c_{j,LD}} = \frac{1}{1+m+n} \frac{[d_2 m^2 nL_{jD}^* + d_2 (1+n)mnL_{iD}^*]}{(nL_{iD}^* + mL_{jD}^*)^2} > 0.$$

³ In Germany, this issue is particularly relevant for the savings banks, as they can raise equity at significantly lower costs compared to other banks due to their higher corporate ratings. These ratings, in turn, are due to government guarantees on their liabilities. The presence of these guarantees can also explain why savings banks are able to attract deposits at relatively low interest rates.

As can be seen in (13a), an increase in the costs of providing loans to domestic clients, *ceteris paribus*, leads to a decrease in the market share of domestic banks in this market. In contrast, as evidenced by (13b), an increase in the costs of foreign competitors, *ceteris paribus*, leads to an increase in the market share of domestic banks. Symmetric results can be derived for foreign banks. *Inter alia*, the impact of deregulation on market shares of foreign banks thus depends on the effect it has on operating costs.

Based on (11a) and (11b), insights on the impact of disintermediation on the loan supply can be gained. Using bond financing as an alternative way to finance the operations of non-financial firms, a decrease in the bond rate will trigger a shift from loan to bond financing, and thus a decline in the loan supply of domestic and foreign banks. As can be seen from (7c), this effect is reinforced by the decline in deposits that arises from a shift to bond investments.

Finally, (fixed) costs of market entry need to be taken into account. If operating profits do not cover these costs, foreign banks may not enter the domestic market. Hence, a relatively small change in variable costs through deregulation may leave relative market shares unaffected. This holds in particular to the extent that investment decisions of banks are irreversible and are made under conditions of uncertainty. The optimal investment policy of a representative bank must thus consider the value of the real investment option: as information about the economic environment improves over time, it pays to wait and to postpone investment (Chen and Mazumdar 1997).⁴ The presence of entry and exit costs thus creates a range of inaction: revenue has to increase sufficiently before banks move into the non-traditional market but, once having entered the new market, they do not leave unless revenues fall substantially.

2.2. Universal banking and disintermediation

The previous discussion has not taken account of specific features of the German banking system, namely the fact that, in contrast to spe-

⁴ Although Chen and Mazumdar discuss *inter alia* the need for the maintenance of firewalls between traditional and non-traditional banking activities, their main conclusions are applicable to the decision of banks to expand outside their home market as well.

cialized banks, German universal banks are allowed to underwrite securities and to hold equity in non-financial firms. *Inter alia*, this gives them the potential to perform corporate governance functions in non-financial firms and to build up long-term customer relationships. Equity holdings of commercial banks play a particularly important role in this contexts as they, on the one hand, enable banks to impose optimal governance structures on firms but, on the other hand, can also lead to conflicts of interests within the banks.⁵

The global trend towards disintermediation has potentially threatened the role of universal banks. Facing increased competition through non-bank financial institutions, universal banks must thus devise strategic responses. As the benefits of universal banks are allegedly due to close customer relationships, universal banking creates a degree of monopolistic market power and allows the banks to capture (information) rents. Rajan (1998) thus argues that the presence of universal banks reduces the contestability of markets and may impede competition.⁶ One result of his model is that, although it may be optimal to separate lending and underwriting from a social planner's point of view, banks would combine the two in order to extract rents. Hence, universal banks are able to "starve independent investment banks of a profitable clientele and force them to exit the market" (p. 23). Such an outcome would be observed despite the fact that investment banks may have comparative advantages in the underwriting business.

The issue of how commercial (universal) banks optimally respond to increased competition is taken up by Boot and Thakor (1997), who analyze competition between commercial and investment banks. Both provide relationship loans (which are monitoring intensive) and transaction loans (which are not). Only commercial banks have access to a federal deposit insurance system and investment banks need to incur search costs if they want to provide loans to companies. Increased competitive pressure on commercial banks can arise either from other commercial banks or from the capital market

⁵ See Brichs Serra, Buch and Nienaber (1997) for a review of the literature on the issue.

⁶ Although universal banks in his model are assumed to have no information advantage over specialized banks, they have a timing advantage and can offer services to firms prior to specialized banks. This, together with the assumption of increasing returns to scale in underwriting, implies that firms may be monopolized by universal banks.

(i.e. via market access of investment banks). In both cases, commercial banks can be expected to increase relationship relative to transaction lending. Rather than expanding into new fields of activities, commercial banks' optimal response to increased competition would thus be to focus operations. As competition reduces the marginal return on banks' lending activities, the optimal level of operations is reduced. Relationship lending is thus likely to shrink as competition becomes sufficiently intense.

The conclusion that increased competition is not necessarily harmful to relational financing is also reached by Aoki and Dinç (1997) and Puri (1999). Aoki and Dinç argue that competition from complementary sources of finance, such as bond markets, is likely to strengthen relational financing, in contrast to competition from other banks, as bonds are closer substitutes to arm's length loans than to relational loans. Furthermore, countries whose financial systems and regulatory frameworks differ need not converge after deregulation, and some type of institutional path dependence might be observed.

2.3. Implications

Banking markets in the past decades have been characterized by deregulation and technological innovation, which have increased the supply of alternative sources of finance and the number of potential competitors. This can have the following implications for the structure of banking markets:

- Handling credit applications and assessing the credit risk of a customer is costly. If these costs are positively related to the 'institutional proximity' of a bank and a client company, we would expect foreign banks to service different market segments than domestic banks and to deal mainly with foreign clients. Entry of foreign banks into market segments traditionally serviced by domestic (commercial) banks will occur only if deregulation has a sufficiently large impact on relative cost structures.

- The impact of increased competition through (foreign) investment banks on the market shares of (domestic) commercial banks is unclear from a theoretical point of view. On the one hand, if foreign banks have comparative advantages over domestic financial insti-

tutions in investment banking activities, we would expect them to have a higher market share in the wholesale than in the retail segment of the domestic market. In this case, disintermediation and market entry of foreign banks would be complementary processes. On the other hand, incumbent universal banks could be able to successfully restrict the market access of investment banks if they have close customer contacts and monopolistic power over firms.

– Facing increased competitive pressure, both through investment and commercial banks, universal banks can be expected to focus on relationship lending. The incumbent banks may lose market shares only if competitive pressure exceeds a certain threshold level.

In what follows, these hypotheses will be confronted with stylized facts of the German banking system, focusing on the activities of foreign banks. Whenever appropriate, we present evidence from the US as a benchmark, where universal banking banned until very recently under the Glass-Steagall Act.

3. Activities of foreign banks

In the previous section, hypotheses on the likely impact of deregulation and technological innovation on the activities of domestic versus foreign banks in Germany have been derived. In this section, we provide evidence on the impact of foreign competition on individual market segments such as the retail and the wholesale market for banking services, and we analyze the determinants of corporate lending by domestic and foreign banks.

3.1. *Institutional background*

At least since the mid-1970s, the German financial system has been comparatively open with respect to foreign competition and capital flows (EC 1997). Since 1976, foreign financial institutions have in principle had the freedom to establish, remaining capital controls and interest rate regulations were fully abolished in 1981, and the EU's Second Banking Directive had been implemented by 1992 (Table

TABLE 1

LIBERALIZATION OF CAPITAL FLOWS AND OF BANKING ACTIVITIES

Germany	
1967	Abolition of majority of capital controls
1976	Freedom of establishment
1978	First Banking Directive implemented
1981	Capital controls fully abolished, interest rate deregulation completed
1988	Proposal for a Second Banking Directive of the European Union (EU)
1992	Second Banking Directive and other EU Directives regulating financial markets become effective; principles of home country control, mutual recognition of banking licenses, and of minimum harmonization are being established
United States	
1933	Glass-Steagall Act, prohibition of banks from underwriting corporate securities
1956	Bank Holding Act, regulatory approval of interstate banking, restriction of non-banking activities of bank holding companies.
1980	Depository Institutions Deregulation and Monetary Control Act, elimination of interest ceilings and increase in allowed activities of savings and loan associations
1994	Interstate and Branching Efficiency Act, permission of interstate branching and nationwide acquisition of banks
1999	Abolition of the Glass-Steagall Act, permission of full affiliations among US banks, insurance companies and securities companies

Sources: Bakker (1994), EC (1997), Santomero and Babbel (1997).

1).⁷ Deregulation in the US has taken a similar path with the deregulation of interest rates taking place at the beginning of the 1980s and the permission of interstate branching towards the mid-1990s. The separation of commercial and investment banking activities, as had previously been enshrined in the Glass-Steagall Act, however, has been abolished only recently.

Deregulation and technological change have promoted disintermediation tendencies both in Europe and in the US. Yet, the disintermediation process has proceeded much further in the US as compared to Germany, where banks remain the largest collector and provider of funds. Moreover, the fact that financial structures both of households and firms change only very gradually over time suggests

⁷ An overview on the institutional structure of the German banking system can be found in Baums and Gruson (1993), Clarich (1987), Danthine *et al.* (1999), or Edwards and Fischer (1994).

that institutional path dependency slows down trends towards the convergence of financial structures. Eventually, this could have implications for the contestability of banking markets. In what follows, we thus study the contestability of the German banking market and contrast the results with evidence for the United States.

3.2. Market shares of foreign banks

The German banking system is notorious for its low degree of market penetration by foreign financial institutions (Table 2). With regard to the balance sheet total, foreign banks' market share has hovered around 4% since the mid-1980s. Foreign banks have been even less successful in attracting business with non-banks, as evidenced by market shares of about 2 and 3% in the deposit and lending business, respectively. Although there has been a statistically significant increase in foreign banks' market share when comparing the 1990s to the 1980s for deposits and loans, the magnitude of this shift has been modest.

TABLE 2
MARKET SHARES OF FOREIGN BANKS IN GERMANY AND IN THE US, 1980-99
(period averages in percent)

	1980-89	1990-99	Probability of equal means between the sub-periods ^a
Germany			
Total assets	4.34	4.33	0.79
Deposits	1.49	2.23	0.00 ^b
Loans	2.26	2.69	0.00 ^b
United States			
Total assets	7.63	12.11	0.00 ^b
Deposits	3.26	6.61	0.00 ^b
Loans	12.06	24.11	0.00 ^b

^a Based on a *t*-test.

^b Significant at the 1% level.

Sources: Deutsche Bundesbank and Federal Reserve (data retrieved via Datastream), own calculations.

Developments in Germany are in contrast to those in other developed market economies, notably the US. Here, market shares of foreign commercial banks have been on a rise at least until 1997, and the expansion of foreign commercial banks has been particularly pro-

nounced in the loan market. By the late 1990s, foreign banks' share in the market segment of commercial and industrial loans reached 20-25% of the total, thus largely exceeding their market share in terms of the balance sheet total (about 10%). As in Germany, foreign banks have had a below-average share in the deposit market, possibly because of their lack of access to a sufficiently large branch network.

The weak performance of foreign banks in Germany with regard to retail banking activities is also in contrast to their dominant presence in the wholesale market. Foreign banks have occupied substantial market shares in the off-balance sheet business, in investment banking as well as in mergers and acquisitions (M&As), at least during the past decade (Landeszentralbank in Hessen 1990 and 1995). Foreign banks accounted for almost 17% of the turnover on the Frankfurt Stock Exchange and for 42% on the German Futures and Options Exchange in the late 1990s (Association of Foreign Banks in Germany 1997). Foreign banks are also very active in the underwriting business, where they held a market share among the 20 leading financial institutions in the D-mark primary market of 42% in 1996. Even more striking are the figures for M&A transactions, where foreign banks achieved a market share of 77% in 1996.

A priori, these differences between the retail and the wholesale market suggest that foreign banks in Germany have been unable to penetrate the traditional markets of domestic banks, and that they service different market segments. In order to obtain first evidence on the links between the activities of domestic and foreign banks, simple correlation coefficients have been calculated (Table 3). We use logs of changes in loans of different banking groups and split the sample into two sub-periods (before and after 1992). For Germany, changes in the loans of foreign and savings banks have been positively correlated, although this link was significant only in the second period under consideration. There is, in contrast, no link between changes in loans of foreign and large bank.⁸ In the US, loans of domestic and foreign banks have been much more highly correlated throughout. To a certain degree, this may be due to the fact that foreign banks have increased their market shares in the US market through the acquisition

⁸ The large banks comprise Deutsche Bank AG, Dresdner Bank AG and Commerzbank AG.

CORRELATIONS BETWEEN CHANGES IN LOANS OF
DOMESTIC AND FOREIGN BANKS, 1986-99

TABLE 3

	1986-92	1993-99	1986-99
Germany			
Foreign and large banks	-0.09	0.07	-0.01
Foreign and savings banks	0.16	0.22*	0.16*
United States			
Foreign and domestic banks	0.56*	0.32*	0.28*

* Significant at the 5% level. Critical values calculated from $2/\sqrt{m}$, $\text{vgdrd } n$ = number of observations.

Source: own calculations.

of incumbent banking institutions, thus overtaking the existing (retail) customer base. In Germany, in contrast, cross-border acquisitions have been rare, and market entry of foreign financial institutions has occurred mainly in the wholesale market.

In summary, as concerns retail banking activities of foreign banks in Germany, there has been an upward shift in the past decades although the magnitude of this shift has been much less pronounced than for the US. At the same time, the market shares of foreign commercial banks are underestimated if one looks at on-balance sheet activities alone:⁹ foreign banks hold substantial market shares in investment banking and other wholesale banking activities. These stylized facts contradict both the earlier evidence reported in Rajan (1998) that foreign banks in Germany have low market shares in the wholesale market and the hypothesis that universal banking generally impedes the contestability of markets.

3.3. Balance sheet adjustments of commercial banks

One distinguishing feature of universal banks is their equity holdings in non-financial firms. Hence, the impact of increased competition on the balance sheet adjustments of German banks can be expected to differ among banks depending on their equity holdings: If relationship lending is linked to the fact that banks hold shares in firms,

⁹ For a similar conclusion for the US see Molyneux, Remolona and Seth (1998) or Boyd and Gertler (1995).

contestability of markets would be the lower the higher the share holdings are.

Although the German banking system is typically taken as the prototype of a universal banking system, important segments of the banking sector are not free to choose their activities. Although the savings banks (Sparkassen), which account for about 20% of the banking system's assets, have universal banking licenses, they do not hold equity in non-financial firms and are restricted in their regional expansion. Perhaps contrary to the conventional wisdom, equity holdings of German banks in non-financial firms are thus not a large asset item. In mid-1999, the share of all participations of banks in other firms (including financial firms) was below 2% of total banking assets (Table 4), having continuously increased from about 0.5% at the beginning of the 1950s. Equity holdings are substantially higher for large commercial banks (5% of assets) than for savings banks (1%).

SHARES AND PARTICIPATIONS OF GERMAN BANKS
IN PERCENT OF TOTAL ASSETS, 1965-99

TABLE 4

	1965	1970	1980	1990	1999
All banks	0.44	0.61	0.81	1.15	1.9
Large banks	0.94	1.44	2.71	5.40	7.1
Savings banks	0.28	0.37	0.35	0.35	1.1
Foreign banks	0.29	1.1

Source: Deutsche Bundesbank (1998), own calculations.

Facing increased competition by non-bank financial institutions, universal banks can be expected to focus their activities on relationship lending (Aoki and Dinç 1997, Boot and Thakor 1997). Unfortunately, evidence on the amount of transaction versus relationship loans is not available as the distinction between these two types of activities is of a qualitative nature. In what follows, we use credits to non-banks (*Buchkredite*) as a proxy for relationship loans and securities of non-banks as well as claims on banks (interbank lending) as proxies for transaction loans (Table 5). For the German banking system as a whole, the share of credits to non-banks has increased continuously from 40% of the balance sheet total in 1950 to a little less than 60% in 1980. Since then, this share has been on a decline. Interestingly, developments for the large banks parallel these general trends up until 1980 after which the share of credits to non-banks has

TABLE 5

CLAIMS OF GERMAN BANKS IN PERCENT OF TOTAL ASSETS, 1950-99

	1950	1960	1970	1980	1990	1999
<i>All banks</i>						
Claims on banks	17.5	21.8	26.2	28.0	35.1	34.7
Claims on non-banks	72.2	67.5	66.5	65.6	58.0	57.5
Credits	39.9	48.5	52.7	58.1	51.0	48.8
Securities	0.9	2.9	3.0	2.4	3.7	7.7
Other claims	10.3	10.7	7.3	6.4	6.9	7.8
<i>Large banks</i>						
Claims on banks	9.9	12.6	18.9	22.0	23.8	27.5
Claims on non-banks	78.8	68.6	66.4	64.7	64.9	57.1
Credits	40.2	35.8	45.6	53.5	53.9	47.8
Securities	0.4	7.9	6.6	5.1	5.9	8.4
Other claims	11.3	18.8	14.7	13.3	11.3	15.4

Source: Deutsche Bundesbank, own calculations.

stabilized for this sub-group. Throughout, holdings of securities of non-banks have been more important for the large banks. This could be taken as weak evidence for a declining share of relationship loans for the banking system as a whole but not for the large banks. This would be in line with the theoretical predictions.

3.4. Lending behavior of domestic and foreign banks

This section takes a more detailed look at the market for corporate loans in Germany and in the United States. More specifically, we are interested in the determinants of loan supply of domestic versus foreign banks. Using time series data on the loan supply of German (US) and foreign banks for the years 1986-98 and distinguishing domestic and foreign demand determinants, we seek to find evidence for a segmentation of markets.

3.4.1. Previous empirical evidence

Previous studies on the determinants of foreign banking activities have primarily focused on the US market. Also, these studies do typically not provide evidence for domestic banks as a benchmark. Hence, they are unable to answer the question whether domestic and foreign banks service different market segments.

One of the first studies by Goldberg and Saunders (1981) uses the share of foreign banks in total commercial banks' assets and loans as a dependent variable. The study finds a significant positive impact of interest rate differentials, of falling price-earnings ratios for US bank stocks, FDI in the US, the depreciation of the dollar, and the expectation of regulatory constraints. Similar results are obtained when the number of foreign banks is used as the dependent variable.

Subsequent studies have largely confirmed these results. Budzeika (1991) analyzes asset and loan demand functions of foreign banks, their subsidiaries and branches by distinguishing domestic (financing of business inventories, financing of capital expenditure, market price of US banks' equity) from foreign demand factors (foreign trade links, flow of funds to the US, exchange rate, interest rate differentials). Using data for the years 1973-89, he finds that activities of foreign bank branches are determined mainly by foreign factors whereas subsidiaries of foreign banks more actively enter the domestic loan market. Goldberg and Grosse (1991 and 1994) find a positive correlation between FDI in the US and the size of the foreign banking sector and foreign banks' presence in the US. However, since first differences of the data are used, no inference can be drawn as regards long-run relationships.

Using bank-level data for about 120 foreign subsidiaries, Molyneux and Seth (1996) analyze simultaneously the performance and the credit extension of foreign banks for the period 1987-91. Their results suggest that domestic demand factors affect the profitability but not necessarily the lending activities of foreign banks. These results are largely confirmed by Molyneux, Remolona and Seth (1998).

One of the few studies for non-US countries is by Fisher and Molyneux (1996) who analyze the number of foreign banks in London in the years 1980-89. They find that outward-UK FDI, trade links, the size of the home-country market, and distance have a positive and that country risk has a negative effect on foreign bank presence.

For Germany, the market for commercial bank loans has been analyzed by Winker (1996), using monthly data for the years 1974-89. Total loan demand is found to be a positive function of the expected level of economic activity and of business cycle effects and a negative function of the interest rates on loans, of the wage share, and of inflation. The target value of banks' lending rates depends positively on the insolvency rate, the costs of deposits, and on the amount of equity of the banks (using the lagged value as an instrument). The simultane-

ous specification of credit demand and supply gives evidence for credit rationing on the German credit market.¹⁰

3.4.2. Estimation approach and results

Ideally, in order to analyze whether banking markets in Germany are segmented, we would need information on the nationality of the recipients of bank loans. Since aggregated banking statistics do not provide such information, we are using total credit supply of domestic and foreign banks as the dependent variable and try to single out the influence of domestic and foreign demand factors: if foreign banks service a market segment different from the one serviced by domestic banks, we would expect loan supply of foreign banks to depend on the foreign but not on the domestic factors, and vice versa. The following reduced-form equations have been estimated

$$(14a) \quad L_i = L_i(X_D, X_F, r_L, r_D)$$

$$(14b) \quad L_j = L_j(X_D, X_F, r_L, r_D)$$

where L_i, L_j = credit supply of domestic (foreign) banks, $X_D(X_F)$ = parameters capturing loan demand of domestic (foreign) firms, and $r_L(r_D)$ = domestic lending (deposit) rates. Credit supply of domestic banks in Germany is proxied by the credit activities of the large universal banks as well as the savings banks.

As a starting point, we have regressed the loan supply of domestic and of foreign banks on a limited number of variables.¹¹ An index of industrial production has been used to proxy domestic demand factors;¹² the real external value of the domestic currency as well as foreign trade activities and FDI in the domestic economy¹³ have been used to proxy foreign demand factors. Additionally, domestic lending and deposit rates should be included to capture the returns and the opportunity costs of granting loans. Because of the high correlation

¹⁰ According to Winker's estimates, excess demand has been in the range of 10% in the late 1970s as well as in the period 1983-87.

¹¹ For a detailed description of the data sources and variables used see Table A.1 in the Appendix.

¹² Using a more comprehensive measure such as GDP would, of course, have been desirable. However, data on GDP have not been available on a monthly basis.

¹³ For the US, monthly FDI data have not been available.

between lending and deposit rates, only the former were used. Likewise, foreign trade variables and the index of industrial production were highly correlated and were thus used in separate specifications of the model.

All variables were seasonally adjusted, using the multiplicative Census X-11 method. With the exception of interest rates, variables were entered in logarithmic form, and the estimated coefficients can thus be interpreted as elasticities. As the variables included in the regression were predominantly found to be non-stationary, i.e. $I(1)$,¹⁴ the equations were estimated in the form of an error-correction model

$$(15) \quad \Delta L_t = c_t + (\alpha_0 - 1) [L_{t-1} - \beta_i X_{t-1}] - \sum_{i=1}^n \alpha_i \Delta L_{t-i} - \sum_{j=0}^m \gamma_j \Delta X_{t-j} + \varepsilon_t .$$

Changes in loan supply L_t thus depend *i*) on deviations from long-run-equilibrium, i.e. on the error-correction term in brackets; *ii*) on short-run effects resulting from changes in the current and lagged exogenous and endogenous variables; and *iii*) on an error term. If the coefficient $(\alpha_0 - 1)$ is significantly less than zero, the null that the variables are not cointegrated can be rejected, and there would be a stationary long-run relationship.

The equation was first estimated by including two lags of each endogenous and exogenous variable ($n=m=2$), and insignificant lags were dropped successively. Standard specification tests were performed. To ensure normal distribution of the residuals, dummy variables were included; heteroskedasticity of the residuals was corrected using the method suggest by White (1980).

For *Germany*, a significant cointegration relationship between real credit and the explanatory variables was found only for the large banks but not for foreign or savings banks. For the foreign banks, there was evidence for parameter instability between 1992 and 1994. Similar results were obtained when, instead of loans granted, total assets of banks were used as a dependent variable. For the large banks, the index of industrial production and (cumulative) FDI in Germany were used in separate specifications because of the high correlation between the two. Generally, the strength of the cointegration relationship between real credit and industrial production was greater than for FDI, which points to a dominance of domestic demand factors.

¹⁴ The results of the ADF-tests are available from the authors upon request.

However, the explanatory power of all equations was low (\bar{R}^2 below 0.2) if no dummy variables were used. Also, the long-run coefficients on industrial production (+4.2) and on the lending rate (-0.05) were either high or had the wrong sign. As regards interest rates this result could be due to the high correlation of lending and deposit rates and the fact that interest rates also reflect funding costs of the banks.

Similar regressions were run for domestic and foreign banks in the United States (Table A.2). In order to make the data comparable, the same time frame (1986-99) was chosen. The explanatory power of our model was much better for domestic US banks (\bar{R}^2 of about 0.55) than for the large German banks but also in comparison to the foreign banks in the US (\bar{R}^2 of about 0.35).

As regards the credit supply of foreign banks in the US, domestic industrial production was the single most important determinant. The domestic lending rate, the real external value of the US dollar, business expectations, the Japanese lending rate (as a proxy of the foreign interest rate), the bond rate, or the nominal external value had no significant influence. The strength of the cointegration relationship increased somewhat when foreign trade turnover was used instead of industrial production as an explanatory variable. Yet, it has not been possible to discriminate clearly between domestic and foreign factors. Results for domestic US banks were similar: either industrial production or foreign trade turnover were significant determinants of credit supply. In addition, the lending rate entered with a significant positive sign, and an increase in the real external value of the US dollar increased credit supply. All other variables turned out to be insignificant.

Overall, we have failed to provide convincing evidence on the determinants of credit supply of banks operating in Germany. While the activities of large German banks can to some degree be explained by domestic demand factors, no statistically significant determinants were found for the foreign or for the savings banks. This is in contrast to evidence for the United States where our approach has worked much better in explaining banks' activities. Potential sources of parameter instability for Germany could be the EU's Single Market Program or the unification process.

For the US, results for domestic and foreign banks are similar in the sense that domestic industrial production and/or foreign trade activities explain credit supply of both types of banks. This may be due to the fact that foreign banks have to a degree expanded their market

shares through the acquisition of domestic banks. At the same time, the fact that some variables explain lending of domestic but not of foreign banks suggests that the determinants of credit supply of the two types of banks differ. Differences to the results of earlier studies on loan supply of foreign banks in the US suggest that structural changes might have occurred.

4. Concluding remarks

This paper has analyzed the impact of increased competition and of global trends towards disintermediation of financial services on the German banking system. From a theoretical point of view, market shares of domestic and foreign banks can to a large extent be explained by prior customer contacts as these reduce information costs. This could hold in particular for universal banking which creates close customer relations and thus a certain degree of monopoly power for the incumbent banks. Increased competition may even strengthen these linkages.

The focus of the empirical part of this paper has been the ability of foreign banks in Germany to acquire market shares. Foreign banks' presence in retail markets has been minor. At the same time, they have occupied substantial market shares in the wholesale market, contradicting the notion that universal banking creates implicit entry barriers for this market. These results are in contrast to the US, where foreign banks have been able to attain much higher market shares also in retail banking. Generally, correlations between the activities of foreign and domestic banks in Germany increased after the initiation of the EU's Single Market program. This could be interpreted as evidence for an increased contestability of the German banking market although links remain much weaker than in the US. In particular for Germany, there has been very little evidence that loan supply of domestic and foreign banks follows a similar and stable pattern. This, in turn, points to the fact that domestic and foreign banks service different market segments.

The results of this paper should be seen as a first approximation to the empirical testing of the impact of competition on the German

universal banking system. Most importantly, as the analysis has largely ignored institutional peculiarities of the German banking system, it would be premature to draw far-reaching policy conclusions. The special role of savings banks, in particular, is likely to constitute entry barriers for the retail segment of the market. Further research which takes explicit account of such institutional factors is needed.

APPENDIX

TABLE A.1

DATA DEFINITIONS AND SOURCES

Variable	Definition and source
AW_REAL	<p>Germany: Real external value of the D-Mark to currencies of 18 industrialized countries, NADJ, seasonally adjusted (Deutsche Bundesbank)</p> <p>United States: Real external value of the US dollar, trade weighted, seasonally adjusted (IMF, <i>International Financial Statistics</i>)</p>
CREDIT _i	Domestic loans (Germany: Buchkredite insgesamt), real (= deflated by producer prices) and seasonally adjusted (multiplicative X11-method) i = d, f (Deutsche Bundesbank and Federal Reserve)
IP	Index of industrial production, seasonally adjusted (IMF, <i>International Financial Statistics</i>)
LEND	Lending rate (IMF, <i>International Financial Statistics</i>)
TRADE	Trade turnover (exports + imports) (Deutsche Bundesbank, <i>International Financial Statistics</i>)

TABLE A.2

ESTIMATES OF LOAN SUPPLY FUNCTIONS FOR THE UNITED STATES, 1986-99

Explanatory variables	Dependent variable (X)			
	domestic banks ($\text{dlog } L_i$)		foreign banks ($\text{dlog } L_i$)	
constant	-0.29*** (-6.67)	-0.34*** (-6.83)	0.07 (1.01)	-0.05 (-0.67)
log X(-1)	-0.03*** (-4.53)	-0.02** (-3.50)	-0.04 (-3.26)	-0.05* (-3.65)
log IP(-1)	0.05*** (7.35)		0.05** (2.07)	
log TRADE(-1)		0.02*** (6.70)		0.03*** (2.63)
log AW_REAL(-1)	0.06*** (6.00)	0.06*** (6.00)	-0.02 (-1.26)	-0.01 (-0.84)
LEND(-1)	0.001*** (3.57)	0.001*** (3.23)	-0.0004 (-0.67)	-0.000 (-0.09)
dlog X(-1)	0.35*** (4.89)	0.37*** (5.16)	0.32** (4.67)	0.31** (4.60)
dlog X(-2)	-0.16** (-2.26)	-0.15** (-2.02)		
dlog IP			-0.42** (-2.25)	
dlog LEND	0.026** (1.99)	0.03*** (2.63)		
dlog AW_REAL(-2)	-0.05** (-1.78)	-0.06** (-1.82)		
\bar{R}^2	0.59	0.57	0.51	0.50
LM1 (prob.)	0.94	0.93	0.29	0.36
LM4 (prob.)	0.68	0.59	0.22	0.36
White-test (prob.)	0.30	0.31	0.17	0.21
Jarque Bera (prob.)	0.60	0.64	0.85	0.88
Number of observations	162	162	162	162
Time period	1986:1-99:6	1986:1-99:6	1986:1-99:6	1986:1-99:6

t-values in brackets, ***(**, *) = significant at the 1 (5, 10) percent level. Dummy variables (not reported) were used to ensure normal distribution of the residuals and to correct for heteroskedasticity. In the case of domestic banks, dummy variables for the following months were used: 86:12, 90:10, 91:02; in the case of foreign banks, dummy variables for the following months were used: 86:05, 89:01, 89:02, 89:03, 89:07, 89:12, 90:01, 91:09, 99:05. The use of dummy variables led to an inflation of the adjusted \bar{R}^2 by up to 0.15.

Source: own calculations.

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