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Global Competition, Fee Income and Interest Rate Margins of Banks

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I. Introduction

The issue of global competition in banking markets has so far received scant attention from researchers despite a plethora of international banking performance studies. The increasing globalization of banking and financial markets in which banks compete, poses new challenges, not only to active participants in the banking business but also to academic research. It appears the literature is only slowly coming to grips with the ramifications of how global competition for funds, customers, and financial services generally impacts on banks. Commonly, competition or its antithesis market power, are mainly extensions of their domestic dimensions in studies that consider international competitive issues. The current literature dealing with international competition appears to be developing in the following directions. *First,* authors enlarge the data base by using international bank panel data and compare differences in market power across countries. *Second,* the entry of foreign banks, either through mergers, joint ventures, subsidiaries or branches exerts competitive pressure on incumbent banks, resulting in falling profitability and/or interest rate margins. However, these approaches ignore the changing nature of the international financial system. Banks now compete in global financial markets for funds and in the provision of financial ser-

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vices. Corporate and bank demand for funds and financial services can be satisfied by banks and financial markets irrespective where they are located. For example, a multinational corporation may seek a loan from a home turf or foreign bank or award the mandate to issue a global bond in its name to a consortium of large banks anywhere in a financial center. The increasingly global nature of competition can be expected to narrow interest rate margins and reduce profitability of banks. Our approach is based on, and extends, the application of dealership models to banking (Stoll 1978, Ho and Stoll 1980, 1983 and of Ho and Saunders, 1981).

The novel feature of this paper consists in including a global market structure variable that measures the degree of openness of the domestic financial system to global money and capital markets. This variable is designed to capture the impact of global competitive forces emanating from open financial markets on domestic and internationally active banks.

In the literature mainly two avenues have been followed to introduce the global dimension of competition into the analysis. *First,* the *entry* of foreign banks is held to diminish the market power of incumbent banks as the newcomers are competing for customers. The resulting more vigorous competition exerts its influence on banks typically by changing input and output prices (interest rates), their cost structure, product mix, technological progress, their profit margins as well as by hastening the *exit* of inefficient banks from the industry. Note, the literature is dealing with the entry and exit of suppliers of banking and other financial services. *Second,* the great bulk of studies attempts to measure the degree of competition within the confines of each country in the context of multi-country studies, dealing mainly with the behavior of incumbent banks.

In such investigations, interest rate margins and bank profitability ratios are most frequently used as the summary measures upon which competition and other factors exert their influence. An alternative research strategy, not pursued here, measures the degree of competition by the impact of factor input price changes on bank revenue along the line of the Panzar-Rosse model (1987).

The widely used n-bank concentration ratio or the Herfindahl index are, by and large, unsuitable measures of market power when dealing with global competition. They focus in a static manner on incumbent banks. This approach all but ignores the impact foreign bank entry can have on competition. In a globalized environment hardly any bank is

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shielded from the impact of international competition which makes its presence felt in a number of ways. Domestic banks may have branches or subsidiaries in foreign jurisdictions while foreign banks likewise may establish their presence in foreign local markets through the subsidiary/ branch mode.

Despite these compelling reasons for casting the competition net wider, very few econometric studies actually try to capture the impact of foreign competition *via* bank entry on profitability. Claessens et al. (2001) are one exception. They document the presence of foreign banks in 80 countries, assess relevant performance differences between domestic and foreign banks and investigate the impact of foreign bank entry on profitability and interest rate margins. Their findings that foreign bank entry tends to reduce profitability and margins of incumbent domestic banks appear to support the notion of the pro-competitive impact of foreign bank entry. Foreign banks, lacking an established customer base, essentially have to compete on price and more favourable terms than established institutions. Engwall et al. (2001) argue along similar lines. However, care has to be taken of the fact that entry of foreign banks into a domestic market may be made for other reasons than exploiting the opportunities that a low competitive environment and inefficient cost structure promise. For example, tiny Luxembourg ranks second in the number of foreign banks behind the US and first by share of total banks. Tax avoidance and evasion reasons are the main motivators. These considerations would also apply to Belgium, Switzerland and even the UK where many large banks underwrite and trade bonds free of withholding tax. Moreover, frequently banks follow their customers abroad and their entry into foreign markets is not motivated by a desire to compete with incumbent banks.

A related study by Demirgüç-Kunt and Huizinga (1999) examines the reasons why margins and profits of foreign banks in developing countries exceed those of domestic banks. The opposite holds for industrial countries. However, the authors do not provide direct evidence for the competitive impact of foreign banks' entry. They attribute the disparate profitability performance in developing countries to superior banking technology and favourable regulatory treatment and the relatively poor business performance to informational disadvantages in industrialized economies. These factors enhance and hamper international competition, respectively.

Another group of studies investigates the impact of aspects of international competition on the performance of European banks during the

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transition to Monetary Union. For comparison purposes, US and Asian banking markets serve as reference benchmarks. These studies focus essentially on the intra-country competitive behaviour of banks for several countries and over time without exploring any cross-country spillover effects. At a more disaggregate level, Neven and Röller (1999) develop and estimate demand/supply functions for mortgages and corporate loans for several European countries. They find that the behaviour of banks has become less collusive over time, presumable due to gradual deregulation. De Bandt and Davis (2000) as well as Shaffer (2001) assess the contestability of banking markets within the framework of Panzar and Rosse's (1987) system of reduced-form revenue equations. Both studies find evidence of non-competitive behaviour and limited degrees of banking market power. Again, the examination of the behaviour in banking markets is strictly on a country-by-country basis. Applications of this technique to the Canadian banking industry are by Nathan and Naeve (1989) and to the Japanese industry by Molyneux et al. (1994). In addition, studies based on concentration ratios and those dealing with foreign bank entry ignore the competitive impact of global financial markets on national banking industries.

Our study is organized as follows. In the next section the model is described and in part 3 the estimation equations are formulated and explained; as well, the role of the variables in the testing of the hypotheses is discussed. In section 4 we present and discuss the estimation results. The final section 5 contains the conclusion, the policy implications and suggestion for further research. The empirical estimates employ OECD Banking Profitability and IMF data.

II. Model Features

Deposit-taking and loan granting affect the interest rate margin of banks which contribute in conjunction with dealing in financial markets substantially to the profitability of banks. We employ a dealership-based model of the bank that allows us to derive the determinants of the margins between the deposit and loan rates. We capture the influences on the bid-ask spreads of banks' dealing in currencies, securities and derivatives using a similar dealership approach. In both models competition plays an important role. We commence with a discussion of the interest rate margin model.

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1. *Dealership-Based Banking Models*

The interest rate margin approach is based on the Ho and Saunders (1981) dealership model which has been extended by Angbazo (1997) and Saunders and Schumacher (2000) and applied at the international level in both studies. Banks as risk averse agents stand ready, just as securities dealers provide immediacy in securities trading by taking buy and sell orders at all times, to accept randomly arriving deposits and loan demands. Analogously to the posted buy and sell prices in securities trading, banks are committed to the advertised deposit and loan rates for the next period. Due to dyssynchronous arrival time of deposit inflows and loan requests, banks select optimal deposit and loan rates that minimize the build-up of unwanted cash reserves and excessive loan demands. They do this by adding a loan-granting fee to the riskless interest rate and subtracting a deposit-granting fee from the riskless rate as compensation for providing immediacy and for bearing interest rate risk.

The optimal fees and thus the interest rate margin between loan and deposit rates (pure spread) depend on the following factors:[1] *First,* the pure spread is influenced by a market structure variable that portrays the demand/supply conditions for deposits and loans. Banks with monopoly power may be able to charge a higher loan rate and offer a lower deposit rate than would be compatible with competitive banking markets. *Second,* interest rate and credit risk impact the spread positively. The former arises when the bank accepts a deposit but lacks an immediate lending outlet. Funds then have to be temporarily parked in the short-term money market. The bank faces reinvestment risk should money market rates fall. Likewise, the arrival of a loan request without a simultaneous funds inflow obliges the bank to borrow. Refinancing risk results when the short-term borrowing rates go up. Naturally, the bank faces credit risk on its loans. *Third,* risk aversion of bank managers tends to widen the spread. However, as risk aversion is difficult to observe and even harder to measure, no study, to our knowledge, has included this variable in empirical estimations. *Finally,* the size of the transaction in the dealership-based model influences the spread positively. Again in empirical estimates this determinant commonly is ignored.

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[1] *Ho* and *Saunders* (1981) provide a derivation of the optimal fees. The loan rate $r^{\ell} = r + b$ where r is the riskless rate and b the loan fee, and the deposit rate $r^{d} = r - a$ where a stands for the deposit charge. The margin thus is $r^{\ell} - r^{d} = (a + b)$.

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We have to *control for other influences* that, in addition to the variables that determine the pure interest rate margin, can be expected to affect the spread. *First, managerial efficiency* as measured by the bank's cost structure allow more cost-efficient banks to reduce the margin as compared to less well managed banks, assuming pricing on the basis of marginal costs. Less efficient banks have to charge a higher margin. *Second,* as implicit interest payments on deposits and concomitant cross subsidization of loan rates have been eroded by deregulation, technological advances and increased competition we attempt to capture this process by including the ratio of non-interest income (fee income) to interest rate income amongst the spread determinants.[2]

The second leg of our theoretical approach analyzes banks' trading in financial markets with a dealership model along the lines of Stoll (1978) and Ho and Stoll (1980 and 1983). The authors derive the determinants of the bid-ask spread in analogous fashion to those of the interest rate margin. Dealers stand ready to buy securities at their bid price P^b usually below the 'true' price P^* [i.e. $P^b = P^*(1 - b')$] and to sell at the ask price P^a, commonly above the 'true' price $[P^a = P^*(1 + a')]$.[3] The bid-ask spread equals $a' + b' = (P^a - P^b)/P^*$ for each security; it compensates the dealer for rendering the service of immediacy and for incurring information-trading costs (counterparty with superior information). The spread depends *first,* on the number of dealers; the more dealers, the lower the spread. *Second,* the variability of the security's return in which the dealer makes a market is positively related to the bid-ask spread. *Third,* a rising (falling) risk aversion of the dealer widens (narrows) the spread. This feature of dealership spread models is commonly ignored in empirical estimations. Again, we would have to control in empirical estimates for managerial efficiency in setting up and running the dealership.

2. *Global Competition*

Interest rate margins and dealing in currencies, securities and derivatives are not the only contributors to banks' profits. They, in addition,

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[2] *Both Angbazo* (1997) and *Saunders* and *Schumacher* (2000) include a variable to control for the effect of implicit interest payments on the interest rate margin without acknowledging the trend towards explicit pricing of banking services.

[3] The 'true' price can be thought of as the price that would materialize in the absence of transactions costs. With homogeneous expectations this view of the price would be shared by dealers and the public.

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receive fees for the provision of various financial services, they earn income from investments and from rendering financial and commercial advice as well as from other services. However, the margins they set, fees they charge as well as the other income sources all are subject to competitive forces.

The exclusive focus on banks in competition studies either in intra-country banking markets or foreign-bank entry investigations misses the important competitive implications of the blurring of international banking and global financial markets. Banks in general, irrespective of where they are located, are touched in various ways by the competition prevailing in financial and capital markets on a global basis. Banks, investment houses and other non-banks set deposit rates and price loan rates at the margin in competition with wholesale money markets and debt securities markets; they trade in bonds, stocks, currencies and derivatives in auction-type trading environments; they underwrite debt securities, provision credit cards and offer a range of other financing services in competition with domestic and international rivals. Consequently, generous spreads, wide interest rate margins and fat fees cannot be preserved behind national borders. It is therefore not possible to infer on the basis of *a priory* reasons from a country-based value of the Hirshman-Herfindahl-Index or the n-banks concentration ratio a likely degree of competition. Thus banks in more concentrated national markets are not necessarily in a position to earn higher profits or charge wider margins due to collusion or other monopolistic reasons than those operating under more competitive conditions.

The traditional approaches to assessing competition fail to capture satisfactory the global dimension of competition in banking markets. *First,* while banks compete, of course, with other domestic and foreign banks, some of their product lines such as deposit taking, the granting of loans to multinational enterprises, trading activities, securities underwriting and funds management, are increasingly exposed to competitive pressure from institutions operating in related markets in the global context. *Second,* virtually the whole SCP-literature focuses on the banking/financial institutions' *entry into,* and *exit from* banking markets as *suppliers* of banking/financial services. The actual and potential supply-behavior of institutions determines the banking market's competitive features and its contestability, implicitly assuming that entering and leaving specific markets is done only by banks and other suppliers of financial services.

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This *supply-side view of the competition* in banking markets ignores the role played by demanders of financial services. They also have, and exercise, their entry and exit options. Examples abound. Corporations can raise funds through loans and the issuance of bonds in domestic, foreign or in off-shore markets. Thus we can expect the migration of demand to markets that offer lower borrowing rates and/or more favourable issuer terms. The mandate for funds under management is commonly footloose and can be transferred to any appropriate financial firm on a global basis. Trading in securities, foreign exchange and associated derivatives is another case in point. Trading can, in principle, be carried out in several financial centers (Tokyo, Sydney or New York) simultaneously by domestic and foreign banks where competitive market conditions and not monopoly power are dominating. Screen trading and electronic broking in currency markets act like an omniscient Walrasian auctioneer, emasculating institutional market power. Moreover, any unexpected tax imposition, unwelcome change in the regulatory environment or burdening with other transactions costs would prompt a relocation of trading rooms to domiciles with more favourable trading environments. In fact, the threat of exit of institutions exerts pro-competitive pressure on regulators and tax authorities to generate an environment that is conducive to engendering a globally level playing field. Competitive-like conditions are achieved without any entry of foreign rivals or threat of entry. The move to around the clock trading has exerted pro-competitive pressure on margins and spreads; positions can be monitored, adjusted and hedged continuously. In the same vein, although only loosely related to banks, companies' shares may be listed on those exchanges that offer deep market liquidity, a broad investor base and where transaction fees are low relative to the listing benefits.

In order to capture these competitive factors engendered by global financial markets, we expand the international database beyond the scope of previous studies in order to test hypotheses about competition on a global basis. We include two variables in our estimation approach that purport to capture global competitive currents. *First,* we measure the openness of the financial system by the sum of inward and outward international investment, weighed by the GDP of the respective country. This variable is designed to reflect the competitive pressure of open financial markets and is expected to negatively affect banks' interest rate margins and their profitability. *Second,* the inclusion of a second variable, the fee-to-interest-income ratio, is based on the rationale that fee-income generating business is subject to more intense competition, espe-

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cially on an international basis, than interest income activities of banks. If so, we would expect a negative relationship from regressing bank interest rate margins and profitability on the fee-to-interest-income ratio. As it turns out, the empirical estimates confirm our conjectures. However, there are other factors that may contribute to the fee/income-profitability relationship. If fee-based activities are more cash-flow certain, the attendant lower risk may decrease required returns. Moreover, a lower required rate of return may also be due to diversification benefits that banks reap from branching out into earning fee income.

III. Estimation Specification

This study investigates the impact of global competition on interest rate margins and bank profitability. As a novel feature of our estimation approach we include a variable that captures the openness of a country's financial system to foreign competition. Due consideration is given to other important determinants of bank performance besides competition, such as the risk of the banking business, banks' cost structure and domestic market power. We also attempt to evaluate the degree to which banks have replaced traditional interest rate margin business with fee-generating activities. As the latter have become increasingly important especially for banks in industrialised countries we attempt to measure the impact of the share of fee income to interest income on profitability. The ratio presumably reflects a mixture of competitive factors and technological advances in banking.

1. The Equations

On the basis of the analysis so far, we propose the following core estimation equations using annual cross country panel data for the years 1993 to 1998.

$$
\begin{aligned}
NIM_i = a &+ b\,(\text{global competition})_i \\
&+ c\,(\text{fees/interest income})_i \\
&+ d\,(\text{cost structure})_i \\
&+ e\,(\text{risk})_i \\
&+ f\,(\text{domestic market power})_i \\
&+ \varepsilon_i
\end{aligned}
\tag{1}
$$

where the net interest rate margin (NIM) is calculated as the difference between interest income and interest expenses divided by total assets.

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We alternatively regress the same set of independent variables on bank profitability which is defined as profits before tax divided by total assets (ROABT).

$$
\begin{aligned}
ROABT_i = a &+ b\,(\text{global competition})_i \\
&+ c\,(\text{fees/interest income})_i \\
&+ d\,(\text{cost structure})_i \\
&+ e\,(\text{risk})_i \\
&+ f\,(\text{domestic market power})_i \\
&+ \varepsilon'_i
\end{aligned}
\tag{2}
$$

On the basis of our subsequent discussion we would expect the estimated parameters of the variables to have the following signs:

$$b < 0, c < 0, d < 0, e > 0 \text{ and } f > 0 \quad \text{with } \varepsilon, \varepsilon'_i \sim N(0, \sigma^2)$$

where the stochastic error terms ε and ε' meet the usual requirements and i stands for the particular year. We experiment with different functional forms as well as alternative proxies for the variables, data availability permitting. We now discuss the independent variables that are included in our estimation equations.

2. *Variable Analysis and Data*

Our empirical estimates of equations (1) and (2) are based on the OECD data set on Bank Profitability (1999) from 1993 to 1998 and on the IMF's International Financial Statistics data base for the construction of the openness variable of the financial systems of individual countries. Details regarding the variables and symbols used are presented in Appendix 1.

a) Global Competition

The variable that gauges a country's exposure to global competition is proxied by the ratio of a country's foreign assets plus foreign liabilities (FA + FL) divided by its GDP, i.e.

$$\text{FAFL/GDP} = \text{Global competition} = \frac{\text{FA} + \text{FL}}{\text{GDP}}$$

Foreign assets (FA) and foreign liabilities (FL) are obtained form the IMF's *International Financial Statistics (IFS)*. They reflect a country's

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international investment position, comprising mainly the stocks of inward and outward foreign direct and portfolio investments which are adjusted for price and exchange rate changes. Assets and liabilities are both measured in US dollars. As the corresponding GDP values are expressed in national currency, we used annual averages of their exchange rates vis-à-vis the dollar for converting local-currency into US dollar GDP values. In order to account for the relative development stage of a country, we divided foreign assets/liabilities by GDP.

b) Fee-Interest-Income Ratio

The *fee income* variable is either represented by the quotient of fee income to gross interest income (FGII) or by the ratio of fee income to net interest income (FII). These variables proxy a mixture of changes in the product palette, technological advances of banks and the competition they face in wholesale and global markets.

Banks have moved increasingly away from focusing on generating interest income towards the earning of fees. Several factors have been driving this process. *First,* deregulation of interest rates forced banks to cease cross-subsidizing certain of their activities. For example, the removal of ceiling on deposit rates induced banks to price deposit and loan rates in line with market forces. Previously, the below market rates on deposits allowed banks to offer lower loan rates than would have been otherwise the case and to compete for depositors and loan customers on non-price terms. Greater freedom in the setting of interest rates resulted in the curtailment of services as well as the unbundling and separate pricing of costs. Banks also branched out into credit cards. *Second,* financial deregulation, advances in computer/telecommunication technologies and the development and application of advanced financial models encouraged trading and dealing in currencies, securities, commodities and their associated derivatives. *Third,* the rise of direct and indirect personal wealth spawned fee-generating funds management activities. *Fourth,* the rapid growth of international trade provided opportunities for the earning of fees (e.g. letter of credit). *Fifth,* the expanding demand for investment banking services emanating from M&As, corporate restructuring and other financial consulting, prompted many banks to move into this growth area.

The fee-to-interest-income ratio thus appears to measure the degree to which banks have adjusted to the new financial deregulated environment. The higher the ratio the more advanced their palette of products

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and services. However, this modern face of banking does not necessarily promise to boost the return on assets (ROA). Fee-income generating banking business tends to be domiciled in wholesale markets and is more global in nature than interest-based activities such as retail deposit taking and loan granting. *A priori* reasoning suggests that such banks are exposed to a level of *intense competition* in wholesale markets and at the international level that any purely domestically-based market power variable is unlikely to reflect. Furthermore, broadening the range of banking activities beyond the focus on interest-generating businesses, entails *diversification benefits*. Diversified banks are less risky than those with a narrow range of products. The ratio of fee income to total income captures the trade-off between return and risk. Moreover, fee-income generating activities involve less credit risk, are more cash-flow certain but have lower margins than interest income business. However, as DeYoung (1994) pointed out, on a risk-adjusted basis, profits may be enhanced. De Bandt and Davis (2000) include this ratio for similar reasons in their estimation approach.

In our estimation equation we interpret the fee/income ratio as a summary gauge for technological advance and product-mix change in banking, as a measure of banks' exposure to international competition and as an expansion of low-risk activities. We expect the fee/interest-income ratio to exert a negative impact on interest rate margins and on bank profitability in our test equations. This is like that for mainly two reasons. *First,* the shift to explicit pricing of services through fees narrowed interest rate margins. *Second,* since one dollar of assets deployed in the competitive fee-income business generates less ROA than it earns in the domestic market's interest income business, return on assets decreases. These effects would be particularly pronounced during a period when banks shift their activities from interest-income to fee-income activities. While our approach does not allow us to clearly separate out domestic from international market power, it is conducive to capturing aspects of global competition. Omitting this structural supply-side variable would attribute its impact on profitability to domestic market power.

c) Cost Structure

Efficiency in delivering banking services constitutes an important determinant of the profitability of banks. The *cost structure* of banks reflects this feature; it is described by the ratio of operating expenses to gross income (OEGI). Operating expenses form the logical numerator of

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cost structure ratio. However, we experimented with several other variables as the denominator, namely liabilities, assets and total income, yielding similar results. A lowering of the cost structure ratio unsurprisingly increases profitability. As we are using country data, a relatively high value of this variable would indicate cost-inefficiency, perhaps suggesting the existence of overbanking.

d) Risk

Economic agents, including financial institutions, are commonly risk averse. Our risk variable (RISK) is measured by the volatility (standard deviation) of the ratio gross income to total balance sheet for the years 1988 to 1998. The mean of the gross income distribution measures the expected value of the income ratio and the standard deviation the income surprises which, of course, can be negative or positive. As is common in finance theory, for symmetrical normal distributions sigma is widely regarded as an appropriate risk proxy. However, our accounting-based measures of performance are not adjusted for risk. We would therefore expect the NIM or ROA to be positively related to risk. Riskier banks have to compensate their stockholders with the promise of higher rates of return. The major risks of banks include market, credit and operational risks. An ideal measure of risk would utilize value-at-risk (VaR) data for countries' banking systems. Alas, data of this nature are not available. To start with, so far only Value-at-Risk measures pertaining to market risk are computed, but not published, by all banks; credit risk indicators are missing.[4]

Risk impacts on interest rate margins and bank profitability in two ways. *First,* bank managers and share holders may exhibit different degrees of *risk aversion* across the various kinds of banks (large and small, universal and specialized, domestic and international, etc.). To our knowledge, all studies ignore this component of risk thus implicitly assuming uniformity of risk aversion amongst banks or hypothesizing risk neutrality. Where risk aversion is mentioned (e.g. Saunders and Schumacher, 2000), the risk uniformity assumption is explicitly made, presumably because of the difficulties in finding an empirical proxy for bankers' risk aversion.

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[4] The New Basel Capital Accord requires banks to uniformly hold capital against risk adjusted assets, that is, adjusted for market, credit and operational risk.

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Second, the banking business involves various kinds of risk such as credit risk, market risk and operational risk. Finance theory predicts a positive relationship between risk and return. Only a few banking studies include amongst the determinants of bank profitability or interest rate margins risk factors, and Saunders and Schumacher (2000) is one recent interest rate margin study that considers risk. They attempt to break down the risk of a bank into credit risk and intermediation risk. The latter is measured by including the volatilities of the borrowing and lending rates as determinants of the interest rate margin. As expected, higher volatilities cause margins to widen.

The capital to assets ratio in their study plays an ambivalent role. On the one hand it purports to measure credit risk. However, as the Basel capital requirement is based on risk-adjusted assets, while the authors use raw asset data, the resulting positive relationship between this ratio and the interest margin lends itself to ambiguous interpretation. To boot, the capital base supports a much broader range of banking business than just interest earnings activities. For example, trading in securities and derivatives requires capital and generates mainly fee but little or no interest income. As banks have tended to replace interest income by fee revenue, the positive link between the interest margin and a rising capital ratio could be spurious. On the other hand, the capital ratio proxies for the costs of regulatory capital requirement. Banks attempt to recoup some of the cost associated with this imposition by setting higher margins.

In a similar vein Lloyd-Williams and Molyneux (1994) include the ratios of capital to assets and loans to deposits as risk variables in their SCP-estimation equation. As one would have expected, the risk variables are either not consistently significant and/or show the wrong sign. Take, for example, the capital/assets ratio. According to the authors, its influence on profitability is expected to be negative, but the estimated coefficients turn out consistently positive and statistically significant. This non-sensical outcome is hardly surprising as the capital account alone does not allow us to slot banks into risk groups. This is so because capital in the ratio is risk-adjusted, but assets are not. On the basis of accounting data, banks with riskier assets will tend to have higher capital ratios making his ratio unsuitable as a risk gauge. However, even if the denominator of the ratio were risk adjusted, the capital-to-assets ratio would still be completely useless as a risk measure (of the market, credit and operational variety) as the Basel capital requirement in fact equalizes ratios across banks. That is banks, whether classified as risky

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or not, still have to hold the same eight per cent of their risk adjusted assets in the form of capital. At least in the eyes of prudential regulators, banks in the triple-A and triple-C risk categories possess an equally adequate capital cushion. Capital cover then offsets risk, making capital ratios meaningless as risk indicators.

We also used unsuccessfully *risk ratings* as an alternative risk measure. This did not come as a surprise as ratings are an inappropriate risk yard stick, for the following reason. The unexpected nature of risk renders ratings an unreliable measure of unexpected outcomes. Ratings tell us that a triple-A bank carries less risk than a triple-C rated institution. Knowledge of this fact allows banks and financial markets to take risk mitigating steps through capital provisioning and credit spread adjustments. Remember, ratings and their migrations are only one amongst many inputs into the PDF of unexpected credit losses. Ratings would more adequately signal risk if they conveyed unexpected *ratings migration.*

e) Market Structure

The market structure in which banks operate determines their ability to influence prices and output. A bank with market power may pay lower borrowing rates on its liabilities and extract higher yields from its assets than would be possible under perfect competitive conditions. *Market power* is represented by an adapted Lerner monopoly index (LMI)

$$LMI = \frac{P - MC}{P} \tag{3}$$

where P stands for price (measured as interest revenues divided by total assets) and MC stands for marginal costs (proxied by interest expenses divided by total assets).[5] The LMI-variable is a consistent and useful indicator of market power in industries with mark-up pricing. Assume C to stand for (marginal or average) cost per unit and P being the price per unit, then mark-up pricing results in:

$$P = (1 + \phi)C \tag{4}$$

[5] When interest rates across the board adjust swiftly to key interest rate changes, either because contracts contain such provisions or because refinancing occurs when interest rates fall, marginal interest rate costs are well approximated by their average values.

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where ϕ is the mark-up. Substituting (4) into (3) we obtain

$$LMI = \frac{(1+\phi)C - C}{(1+\phi)C} = \frac{\phi}{1+\phi} \tag{5}$$

Obviously, the size of the LMI does not depend on C. The LMI-value reflects the (enduring) ability of a firm or an industry as a whole to set prices that exceed unit cost. Since mark-up pricing is quite common practice in the banking industry, and because the LMI values can be easily extracted from our aggregate data, the index can be used as a convenient proxy for market power in our empirical study.[6]

We prefer the Lerner index of market power to the behaviour-free concentration indices because the size of banks whether measured in terms of deposits, relative size of their balance sheets or income generated, might not necessarily capture appropriately the degree of competitive behaviour. The Lerner index provides more pertinent information about the actual price-setting behaviour of banks in relationship to their cost structures than static market power measures are able to convey. However, this summary index fails to distinguish between banks' exposure to domestic and to wholesale/global competition. It remains an empirical matter whether market power retains its influence in the face of global competitive forces.

IV. Estimation Results

Our estimations are based on annual panel data for the years 1993 to 1998. Since the European banking industry changed with the opening of a common banking market within the European Community in 1992, we abstained from using data for the period before 1992. Our sample includes 19 countries; they are listed in Table 1 which also contains the descriptive statistics of the country specific data set. The following Table 2 contains the basic statistics of the variables and Table 3 contains the correlation matrix of the variables.

In Table 4 we present a summary of our test results for interest rate margins, NIM as given in equations (1); Table 5 contains the results for the ROABT-equation (2). We applied both one stage Generalized Least

[6] A referee suggested that the LMI may reflect factors other than market power. For example, when interest rates rise, margins may fall relatively. Even though the LMI (and the interest margin) depends on the level of interest rates, the resulting decrease in the index presumably indicates weakening market power because loan customers are in a more vulnerable business condition.

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Squares (GLS) procedures and a two stage Weighted Least Squares (WLS) estimation procedure. Both techniques are especially suitable for data sets where serial correlation and/or heteroscedasticity might be present (Pindyck and Rubinfeld 1998, 148 ff.).

Our findings for both NIM and ROABT estimation versions lend credence to our approach. All coefficients show the expected signs and most are significant at the commonly accepted levels. The interest rate margin (NIM) is negatively influenced with high statistical significance (the one percent level) by the ratio of fees to gross interest income (FGII). The estimates appear to reflect the expected structural changes in the national banking sectors where cross-subsidization of services out of generous interest rate margins is replaced by cost-based pricing and a concomitant narrowing of margins. In addition, banks may have increasingly shifted their business activities to new fee-income generating transactions such as trading in securities and derivatives where competition is intense. This appears to explain the negative relationship between FII and the before-tax rate return on assets in Table 5. Both performance measures are, as expected, influenced negatively by the cost-structure variable, and in a statistically significant way. In accordance with finance theory, the larger the riskiness (RISK) of a country's banking business, the higher its expected profitability. The coefficients in all equations are highly significant. Measuring risk by the standard deviation of operating income appears to bear fruit as it is in the spirit of Value-at-Risk approaches of capturing the unexpected nature of risk. We pointed out above some of the ill-defined risk variables in previous studies. The market power variable LMI is insignificant at the usual statistical acceptance levels when included together with the global competition variable, confirming our *a priori* expectations. Including market power without the variable measuring the impact of global competition, results in the usual positive relationship between monopoly power and interest rate margins (Gischer and Jüttner, 2002) on the one hand and profitability on the other. Our proxy for global competition, FAFL/GDP, shows the expected negative direction of influence on bank's interest rate margins and profitability. Its statistical significance is more consistent for NIM than for ROABT. The negative relationship lends support to our view that total banks' net interest incomes and return on assets are exposed to international competition, curtailing their rate-setting and fee-charging ability.

The adjusted R^2 fall in the upper range of values reported in similar studies. Furthermore, the results are virtually unaffected as far as the

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Table 1

Descriptive Statistics of Country Specific Data (all items in per cent)

Country	ROABT			MIN			FII			FGII		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Australia	0.79	1.22	1.45	1.95	2.36	2.58	0.56	0.70	0.86	0.20	0.25	0.29
Austria	0.39	0.44	0.49	1.36	1.71	2.11	0.39	0.63	0.90	0.11	0.18	0.25
Belgium	0.33	0.38	0.44	1.07	1.21	1.35	0.40	0.58	1.00	0.05	0.08	0.14
Canada	0.68	1.01	1.20	2.15	2.46	2.80	0.50	0.63	0.82	0.18	0.23	0.29
Denmark	0.00	0.89	1.41	2.07	3.02	3.94	–0.14	0.35	0.57	–0.07	0.14	0.21
Finland	–1.42	–0.20	0.86	1.64	1.74	1.87	0.76	0.98	1.38	0.23	0.32	0.43
France	0.02	0.18	0.35	0.74	1.06	1.33	0.60	0.93	1.43	0.11	0.15	0.19
Germany	0.47	0.56	0.71	1.56	1.92	2.18	0.24	0.32	0.55	0.08	0.10	0.16
Italy	0.28	0.53	0.90	2.29	2.65	2.99	0.25	0.37	0.55	0.09	0.13	0.22
Japan	–0.76	–0.19	0.18	1.25	1.35	1.45	–0.19	–0.03	0.06	–0.10	–0.01	0.03
Netherlands	0.61	0.71	0.77	1.73	1.82	1.89	0.40	0.55	0.67	0.11	0.15	0.18
NZ	1.23	1.36	1.51	2.50	2.66	2.85	0.57	0.59	0.64	0.16	0.18	0.23
Portugal	0.40	0.69	0.86	2.00	2.38	3.19	0.28	1.07	4.52	0.08	0.30	1.22
Spain	0.36	0.78	0.95	2.40	2.77	3.29	0.27	0.36	0.47	0.10	0.13	0.20
Sweden	0.33	0.95	1.33	1.44	2.32	2.96	0.54	0.83	1.27	0.17	0.26	0.35
Switzerland	0.11	0.49	0.79	1.15	1.37	1.86	0.95	1.32	1.53	0.30	0.40	0.47
Turkey	2.98	4.25	4.80	9.08	11.28	12.83	–0.29	–0.10	0.04	–0.10	–0.03	0.01
United Kingdom	0.76	1.10	1.23	2.06	2.24	2.45	0.63	0.70	0.80	0.22	0.26	0.29
US	1.56	1.67	1.80	3.39	3.56	3.73	0.47	0.54	0.65	0.25	0.28	0.32

Note: All items in percent

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Table 1 (continued)

Country	OEGI			LMI			FAFL/GDP			Risk (88–98)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Australia	61.06	63.67	66.72	0.34	0.36	0.41	1.22	1.31	1.49	0.43	0.43	0.43
Austria	63.49	67.41	69.45	0.27	0.29	0.30	1.40	1.67	2.04	0.19	0.19	0.19
Belgium	63.50	66.72	71.72	0.13	0.14	0.15	4.08	4.38	4.87	0.13	0.13	0.13
Canada	63.74	64.70	67.86	0.31	0.36	0.42	1.31	1.54	1.77	0.22	0.22	0.22
Denmark	51.09	58.91	72.51	0.37	0.45	0.59	1.63	1.94	2.42	0.67	0.67	0.67
Finland	73.36	106.12	139.89	0.22	0.33	0.42	1.31	1.58	2.11	0.42	0.42	0.42
France	64.75	68.00	71.28	0.13	0.30	0.61	1.19	1.45	1.86	0.23	0.23	0.23
Germany	57.60	62.09	64.16	0.28	0.30	0.32	1.21	1.47	2.05	0.17	0.17	0.17
Italy	60.80	65.85	69.07	0.32	0.35	0.41	0.99	1.25	1.70	0.39	0.39	0.39
Japan	66.54	76.09	91.79	0.29	0.38	0.49	0.88	1.29	2.47	0.14	0.14	0.14
Netherlands	66.56	68.03	70.78	0.24	0.27	0.28	3.00	3.64	5.13	0.18	0.18	0.18
NZ	61.55	67.19	71.48	0.25	0.30	0.36	1.24	1.41	1.66	0.39	0.39	0.39
Portugal	55.42	60.50	64.94	0.27	0.29	0.33	1.01	1.60	2.48	1.10	1.10	1.10
Spain	59.65	61.14	63.23	0.31	0.35	0.43	1.09	1.27	1.67	0.66	0.66	0.66
Sweden	64.28	78.77	106.51	0.28	0.34	0.41	1.89	2.31	2.88	0.94	0.94	0.94
Switzerland	48.64	57.09	66.14	0.28	0.30	0.32	4.44	5.54	7.73	0.28	0.28	0.28
Turkey	37.93	45.65	50.04	0.29	0.33	0.41	0.48	0.61	0.67	1.34	1.34	1.34
United Kingdom	56.49	61.80	64.09	0.34	0.36	0.38	3.99	4.52	5.12	0.65	0.65	0.65
US	60.59	63.09	64.91	0.49	0.51	0.55	0.95	1.20	1.54	0.52	0.52	0.52

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Table 2

Descriptive Statistics of Data Set: Period 1993 to 1998

Variable	Mean	Variance	Std. Deviation	Maximum	Minimum
ROABT	0.87	1.06	1.03	4.80	–1.42
NIM	2.67	5.30	2.30	12.83	0.74
FII	0.58	0.29	0.54	4.52	–0.29
FGII	0.17	0.02	0.16	1.22	–0.10
OEGI	66.01	192.03	13.86	139.89	37.93
LMI	0.33	0.01	0.10	0.613	0.13
FAFL/GDP	1.95	1.80	1.34	7.73	0.48
RISK	0.44	0.11	0.33	1.34	0.13

Note: Number of observations 114. There are 19 countries in the sample. Risk measured over 1988 to 1998.

Table 3

Correlation Matrix of Variables: Period 1993 to 1998

Variables	ROABT	NIM	FII	FGI	OEGI	LMI	FA+FL/GDP	RISK
ROABT	1							
NIM	0.858	1						
FII	–0.254	–0.372	1					
FGII	–0.153	–0.317	0.926	1				
OEGI	–0.634	–0.412	0.177	0.123	1			
LMI	0.156	0.176	–0.209	0.049	–0.082	1		
FA+FL/GDP	–0.268	–0.379	0.354	0.273	–0.050	–0.374	1	
RISK	0.673	0.767	–0.115	–0.055	–0.357	0.187	–0.365	1

Note: Number of observations 114. There are 19 countries in the sample. Risk measured over 1988 to 1998.

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Table 4

Impact of Global Competition on NIM with Fixed Effects Estimations
Equation (1)

	NIM GLS estimates		NIM WLS estimates	
FGII	–3.60 (–3.90***)	–3.55 (–3.73***)	–3.22 (–4.20***)	–3.29 (–3.98***)
FII				
OEGI	–0.03 (–3.30***)	–0.03 (–3.30***)	–0.03 (–3.55***)	–0.03 (–3.56***)
RISK	3.93 (9.68***)	3.93 (9.50***)	3.85 (9.94***)	3.85 (9.75***)
LMI	0.15 (0.11)	0.01 (0.01)	0.32 (0.23)	0.16 (0.11)
FAFL/GDP	–0.25 (–2.37**)	–0.24 (–2.25**)	–0.25 (–2.50**)	–0.25 (–2.78**)
C	4.03 (4.14***)		4.04 (4.32***)	
CY1998		4.11		4.13
CY1997		3.97		4.00
CY1996		4.16		4.18
CY1995		3.94		3.98
CY1994		4.27		4.31
CY1993		4.33		4.37
adj. R^2	0.62	0.61	0.66	0.65
DW	1.94	1.98	1.95	1.99
F	38.53***	46.79***	44.39***	54.13***

t-values are reported in parentheses.***, **, * denote significance on a 1 percent, 5 percent or 10 percent level, respectively

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Table 5

Impact of Global Competition on ROABT with Fixed Effects Estimations
Equation (2)

	ROABT GLS estimates		ROABT WLS estimates	
FGII				
FII	–0.18 (–1.50)	–0.21 (–1.71*)	–0.20 (–1.91*)	–0.24 (–2.19**)
OEGI	–0.03 (–7.82***)	–0.03 (–7.37***)	–0.03 (–7.90***)	–0.03 (–7.44***)
RISK	1.41 (7.89***)	1.41 (7.81***)	1.41 (7.93***)	1.42 (7.90***)
LMI	–0.25 (–0.40)	–0.21 (–0.33)	–0.25 (–0.40)	–0.19 (–0.31)
FAFL/GDP	–0.08 (–1.69*)	–0.08 (–1.73*)	–0.08 (–1.69)	–0.08 (–1.71)
C	2.82 (6.66***)		2.87 (6.79***)	
CY1998		2.85		2.86
CY1997		2.83		2.82
CY1996		2.86		2.87
CY1995		2.76		2.77
CY1994		2.66		2.66
CY1993		2.63		2.63
adj. R^2	0.63	0.63	0.65	0.64
DW	2.03	2.03	2.03	2.04
F	40.17***	49.68***	42.58***	53.19***

t-values are reported in parentheses.***, **, * denote significance on a 1 percent, 5 percent or 10 percent level, respectively

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method of estimation is concerned. All of the values of the coefficients lie in a similar range irrespective of whether GLS or WLS is applied. Furthermore, the highly significant F-values suggest an appropriate specification of the overall model. In conjunction with the value of the DW-statistic there is no apparent evidence for structural changes.

The fixed effects method of estimation generates coefficients that are reported in the bottom half of Table 4. Although the coefficients of the intercepts $CYj, j = 1993, , 1998$, vary[7] they are relatively close together on average, we can thus exclude the existence of structural breaks between the years.

V. Conclusions

The major thrust and novel feature of the estimation results provide strong support for the impact of global competition on banks' interest rate margins and profitability. Our test outcomes show that studies with a narrower focus on local market power ignore the spill-over effects of competition in global financial markets on domestic banking operations. By including the ratio of each country's total foreign assets plus liabilities to GDP in our model we provide an avenue for competition in global financial markets to exert its interest rate margin-narrowing and return-reducing influences on the operations of domestic banks in their respective countries. We also find strong evidence for the expected inverse impact of the fee-to-income ratio on the interest rate margin, whereas the negative influence on profitability is not strongly, in the statistical sense, supported by our estimates. We interpret the fee-to-interest-income ratio as a summary measure of competition in wholesale markets, as a reflection of advanced product mix, and as a variable capturing diversification benefits. The study engenders strong support for the expected positive impacts of risk on, and the negative relation of cost structure to the return on assets after tax as well as to the net interest margin, regardless of the model specification or the applied estimation techniques. While the relationship between costs and profits is not really surprising, the insight that a risk variable measured by the volatility of gross income affects profitability is both novel and instructive. All our estimation equations are highly significant with overall adjusted coefficients of determination in the range of 0.65. There is no evidence for mis-

[7] The intercepts may be interpreted as the residual profit rate not explained by the independent variables.

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specification or structural changes. The question of further separating domestic from global competition requires additional research. From a public policy perspective our estimates appear to contain a more benign interpretation of banks' frequently criticized shift to fee-income generating business than previous studies suggested. For bank customers generally the benefits from lower interest rate margins may outweigh the shift to cost-based fees. While earlier structure-conduct-performance studies search for, and highlight, the potential for exploitation of customers through market power of some banks, we show this view to be a chimera resulting form an omission of the intense competition they face from global financial markets. Bank customers appear to benefit form the explicit pricing of services in the form of lower interest rate margins.

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Appendix 1
Symbols and Variables

(item numbers corresponding to OECD data tables)

ROABT: return on assets before tax = profit before tax in per cent of balance sheet total (item 48)

NIM: net interest rate margin = net interest income in per cent of balance sheet total (item 42)

LMI: market structure proxy (Lerner monopoly index) = (interest income in per cent of balance sheet total minus interest expenses in per cent of balance sheet total) divided by interest income in per cent of balance sheet total ((item 40 – item 41)/item 40)

FII: fee to interest income ratio = non-interest income divided by net interest income (item 4/item 3)

FGII: fee to gross interest income ratio = non-interest income divided by interest income (item 4/item 1)

OEGI: operating expenses to gross income ratio = operating expenses in per cent of gross income (item 55)

RISK: standard deviation of gross income in per cent of balance sheet total = $\sigma_{(item44)}$ (Data 1988–1998)

FA + FL: Foreign Assets plus Foreign Liabilities, lines 79aad and 79lad of *International Financial Statistics*

GDP: Gross Domestic Product, line 99b.c of *IFS*.

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Summary

Global Competition, Fee Income and Interest Rate Margins of Banks

The major thrust and novel feature of our study is the search for and the evidence we provide regarding the impact of global competition on banks' interest rate margins and profitability. Our panel data approach utilizes the OECD banking data set and IMF statistics. We base our estimation approach on the dealership models of Stoll (1978), Ho and Stoll (1980) and Ho and Saunders (1981). Subsequent studies with a narrow focus on country-restricted monopoly measures (Saunders and Schumacher, 2000) in banking market or on foreign bank entry features (Claessens et al., 2001) ignore the spill-over effects of competition in global financial markets on domestic banking operations. We provide an avenue for competition in global financial markets to exert its influence on the operations of domestic banks in their respective countries by including the ratio of total foreign assets and liabilities to GDP in our model. This variable portrays the openness of the domestic financial system to global competition. Our estimation results suggest that exposure to global competition tends to narrow net interest rate margins and to reduce the rate of return on assets. We also find strong evidence for the expected inverse impact of the fee-to-income ratio on the interest rate margin and on profitability. The fee-to-interest-income ratio serves as a summary measure of competition in wholesale markets, as a reflection of advanced product mix, and as a variable which mirrors diversification benefits. Furthermore, a novel risk measure (volatility of gross income) impacts positively on the return on assets after tax as well as on the net interest margin, regardless of the model specification or the applied estimation techniques while costs show a negative relation to bank performance measures. (JEL G 21, L 11)

Zusammenfassung

Globaler Wettbewerb, Provisionseinkommen und Zinsmargen der Banken

In einer Panel-Untersuchung auf der Grundlage von OECD-Daten weisen wir einen Einfluss des globalen Wettbewerbs auf die Zinsmargen und die Profitabilität der Banken nach. Bisherige Wettbewerbsstudien beschränken sich vornehmlich auf nationale Marktstrukturmerkmale. Für unseren Schätzansatz greifen wir auf die Dealership-Modelle von Stoll (1978) bzw. Ho und Saunders (1981) zurück. Die bereits vorliegenden Studien fokussieren auf einen auf einzelne Länder beschränkten Monopolgrad oder sie untersuchen einseitig die Auswirkungen des Zuganges ausländischer Banken in einzelnen Ländern (Claessens et al., 2001). Alle Arbeiten ignorieren indes die länderübergreifenden Auswirkungen des globalen Wettbewerbs, der von internationalen Finanzmärkten auf die heimische Bankenbranche einwirkt. Unser Modellansatz erlaubt es uns, den Einfluss des globalen Wettbewerbs durch Berücksichtigung einer speziellen Variablen auf das Geschehen in den jeweiligen nationalen Bankenmärkten einzufangen. Die vorgeschlagene Kennziffer misst die Offenheit nationaler Finanzmärkte für internationale Konkurrenten. Unsere empirischen Ergebnisse belegen, dass unter dem Einfluss des

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internationalen Wettbewerbs die Zinsmargen sowie die durchschnittliche Profitabilität zurückgehen. Weiterhin unterstützt der empirische Befund die These einer negativen Beziehung zwischen dem Verhältnis von Provisions- zu Zinseinkommen einerseits sowie Zinsmargen und Profitabilität andererseits. Der Quotient aus Provisions- zu Zinseinkommen spiegelt (relative) Wettbewerbunterschiede auf Finanzmärkten wider, er schlägt sich in einer stärker differenzierten Produktpalette nieder und erfasst Diversifikationsvorteile. Darüber hinaus beeinflusst ein neu entwickeltes Risikomaß (Volatilität des Bruttoeinkommens) positiv die Ertragsrate und die Nettozinsmarge der Banken, unabhängig von der Modellspezifizierung oder der angewandten Schätzmethode.

Résumé

Concurrence globale, revenus de provisions et marges d'intérêts des banques

Sur base de données de l'OCDE, les auteurs de cet article démontrent dans une analyse de données panélisées l'influence de la concurrence globale sur les marges d'intérêts et sur la rentabilité des banques. Les analyses de la concurrence se limitaient jusqu'à présent surtout aux caractéristiques nationales de la structure du marché. Les auteurs de cet article basent leurs estimations sur les modèles de Dealership de Stoll (1978), de Ho et Saunders (1981). Les études postérieures se concentrent sur des mesures monopolistiques qui se limitent aux pays ou elles analysent unilatéralement les conséquences de l'accès des banques étrangères dans les différents pays (Claessens et al., 2001). Tous les travaux ignorent cependant l'impact de la concurrence globale qui influe des marchés financiers internationaux sur les opérations bancaires domestiques. Le modèle présenté ici permet de capter l'influence de la concurrence globale sur les opérations bancaires nationales respectives en tenant compte d'une variable spéciale. L'indice proposé mesure l'ouverture des marchés financiers nationaux à la concurrence internationale. Les résultats empiriques montrent que les marges d'intérêts et la rentabilité moyenne diminuent sous l'influence de la concurrence internationale. De plus, le résultat empirique soutient la thèse d'un rapport négatif entre les revenus de provisions et ceux d'intérêts d'une part et entre les marges d'intérêts et la rentabilité d'autre part. Le quotient revenus de provisions – revenus d'intérêts reflète des différences concurrentielles relatives sur les marchés financiers; il se retrouve dans une diversification de produits plus forte et inclut les avantages de la diversification. De plus, une nouvelle mesure de risques (volatilité du revenu brut) influence positivement le taux de bénéfice et la marge nette d'intérêts des banques, indépendamment du modèle de spécification ou de la méthode d'estimation.

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