PAYING FOR BANKING SERVICES: WHAT DETERMINES THE FEES?

Pavel Dvořák
Jan Hanousek

CERGE-EI

Charles University
Center for Economic Research and Graduate Education
Academy of Sciences of the Czech Republic
Economics Institute

WORKING PAPER SERIES (ISSN 1211-3298)
Electronic Version

388

Working Paper Series **388**
(ISSN 1211-3298)

Paying for Banking Services: What Determines the Fees?

Pavel Dvořák
Jan Hanousek

CERGE-EI
Prague, August 2009

ISBN 978-80-7343-189-1 (Univerzita Karlova. Centrum pro ekonomický výzkum a doktorské studium)
ISBN 978-80-7344-178-4 (Národohospodářský ústav AV ČR, v.v.i.)

Paying for Banking Services: What Determines the Fees?

Pavel Dvořák*
Jan Hanousek**

Abstract

We analyze a unique dataset to test an empirical model of retail bank fee determinants in five Central European countries. Due to the data structure we can cope with heterogeneity and cross-subsidization by employing a representative fee index instead of using variables associated with individual fees. We find support for the Structure-Conduct-Performance hypothesis about the effect of industry concentration, the importance of differences in reliance on cashless payments, and differences in the labor intensity and technology level of bank operations. We also show that cross-country differences in retail bank fees can be explained by fundamental economic factors.

Abstrakt

Předmětem této práce je analýza determinantů retailových bankovních poplatků v pěti zemích střední Evropy. Analýza navrženého empirického modelu je provedena s využitím unikátních dat, která využívají jako vysvětlovanou proměnnou index bankovních poplatků placených reprezentativním klientem namísto jednotlivých typů bankovních poplatků. Zvolený přístup zohledňuje značnou heterogenitu v cenových strategiích jednotlivých bank. Výsledky provedené analýzy jako významné faktory identifikují úroveň koncentrace bankovního odvětví (podpora Structure-Conduct-Performance hypotézy), závislost dané země na bezhotovostních platbách a rozdíly v technologické úrovni a pracovní náročnosti procesů jednotlivých bank. Závěry analýzy implikují, že mezinárodní rozdíly ve výši retailových bankovních poplatků je možné vysvětlit prostřednictvím fundamentálních ekonomických faktorů.

Keywords: banking, bank fees, Central and Eastern Europe, international comparison, Structure-Conduct-Performance hypothesis.
JEL classification:G21, L11, G28, D41, C81

* European Bank for Reconstruction and Development, London, United Kingdom and CERGE-EI, Prague.
** CERGE-EI is a joint workplace of the Center for Economic Research and Graduate Education, Charles University, and the Economics Institute of Academy of Sciences of the Czech Republic; AAU, Prague; WDI, Michigan; and CEPR, London.

We would like to thank Jan Bena, Martin Čihák, Randall Filer, Barbara Forbes, Peter Katuščák, Evžen Kočenda, and Evan Kraft for helpful comments. We are also indebted to Scott & Rose, s.r.o. who have provided us with a unique dataset on fee indices and thus have been an important partner of our research project. GAČR grant (402/09/1595) support is gratefully acknowledged. The views expressed are those of the authors and do not necessarily reflect the position of any of the affiliated institutions.

Introduction

Compared to the extensive body of empirical papers on the determinants of bank interest rates, very few empirical studies have dealt with retail bank fees. The main reason appears to be the impossibility—or, even in the case of the U.S.A., the extreme difficulty—of obtaining quality data on retail bank fees of the size and level of detail necessary for rigorous empirical analysis (Hannan, 2006). Because of the high degree of heterogeneity in bank fees and different cross-subsidizations it has been difficult to implement an appropriate approach in any cross-country comparison due to data restrictions.

Let us note, however, that a number of papers imply that banks' decisions about interest rates and fees are interconnected. Specifically, Lepetit et al. (2008) and Demirgüç-Kunt, Laeven and Levine (2004) find an inverse relationship between measures of fee income and interest margins.[1] Thus, their results support the hypothesis of cross-subsidization between interest- and non-interest-bearing activities and also suggest that the link between the fee levels and the margins should be controlled for in any empirical analysis.

As reviewed by Brewer and Jackson (2006) or Shaffer (2004), the two main competing theories on the relationship between industry concentration and pricing are the Structure-Conduct-Performance (SCP) hypothesis (Mason (1939) and Bain (1951, 1956)) and the Efficient Structure hypothesis (ES) (Demsetz (1973) and Peltzman (1977)).[2] Within the context of the banking industry, a number of

[1] Two main approaches have been used to study the determination of interest margins: the dealership approach (Ho and Saunders (1981), Allen (1988)) and the industrial organization approach to the banking firm (building on the Monti-Klein model, e.g. Zarruck (1989) and Wong (1997), among others).

[2] It should be noted, however, that a distinctive strand of literature implies doubts about a systematic link between concentration and competitive behavior. This is the contestability literature based on Baumol (1982) and Baumol et al. (1982), which implies that even an industry

studies have found a negative relationship between deposit interest rates and concentration, thus supporting the SCP hypothesis (Berger and Hannan (1989), Calem and Carlino (1991), Hannan and Berger (1991), Jackson (1992), and Brewer and Jackson (2006)).[3] The existing literature implies that among the most likely supply-side factors affecting the vast differences in bank fees from country to country are bank costs, market competitiveness, and the extent and form of banking industry regulation. Among demand-side factors, cross-subsidization between different bank products is a possibility as banks try to maximize the benefits from a pool of clients with given demand characteristics.

Our empirical analysis of the cross-country determinants of bank fees is made possible by the availability of a unique dataset on bank fee levels in five Central European countries: Austria, the Czech Republic, Hungary, Poland and Slovakia. The structure of our dataset enables us to cope with heterogeneity and cross-subsidization by employing a representative fee index instead of using variables associated with individual fees.

The socio-geographic region formed by these countries has several important advantages for our purposes. First, these countries are characterized by significant differences in the maturity of their banking sectors.[4] When compared with Austria, a traditionally strong banking country, the other four countries are still in

---

with only one firm but with low enough barriers to mobility can be characterized by prices close to the perfectly competitive level.

[3] The typical specification in this research includes the Herfindahl-Hirschman index of industry concentration or the top-three-firm concentration ratio as a measure of concentration, plus a vector of control variables. Brewer and Jackson (2006) show that it is important to control for bank-specific riskiness, since otherwise there might be spurious regression as banks in more concentrated markets might be less risky and thus charge lower rates. The existence of the positive link between individual bank riskiness and deposit rates is shown by Brewer and Mondschean (1994) and the negative link between concentration and riskiness by Rhoades and Rutz (1982). Brewer and Jackson (2006) thus include measures of capital adequacy and asset quality.

[4] See Hanousek, Kocenda and Ondko (2007), which documents the differences in the privatization of the banking sectors in Central and Eastern European countries, as well as the ensuing significant changes in financial flows between the banking sector and other sectors of the economy.

the process of gradually developing their banking sectors. Second, since much of the geographic region in our dataset shares a common history as part of the Austro-Hungarian Empire, these Central European countries form a compact group with strong cultural and historical links, except for the fact that Austria does not share a communist history as a Soviet satellite like the other four do. As a result, there are important similarities in consumption habits and needs,[5] in views about the role of money, and in the ultimate behavior of bank clients in relation to banks. To summarize, the time span along with the differences in development help identify the effects of the variables in our model, and the similarities make it easier to compare fee levels across these countries.

Overall, our analysis can be understood as one of the first cross-country empirical studies on the determinants of bank fees and as a contribution to the literature testing the contradictory empirical predictions of the SCP and ES hypotheses regarding the influence of concentration on prices in the banking industry. From the policymaking point of view our contribution sheds light on the issue of whether there are fundamental economic reasons for cross-country differences in bank fees; namely, we show that fees scaled by proxies for purchasing power parity tend to be higher in less developed countries. Last but not least, our results support recent international comparisons (Capgemini, ING and EFMA 2005, 2006) that report a negative relationship between the economic level of a country and fee levels scaled by GDP per capita.

[5] For cross-country comparisons of cultural and sociological values see e.g. Musil (2007) and his references. Note that many comparative projects exist and provide data for each country: for sociological/cultural surveys see www.europeansocialsurvey.org and www.worldvaluessurvey.org, among others.

Model

Conceptually, we base our model mainly on the setups of Hannan (2006) and Brewer and Jackson (2006). In contrast to Hannan (2006), we use an index of fees instead of individual fees as the dependent variable and we modify the setup to control for greater heterogeneity in the data. Unlike Brewer and Jackson (2006),[6] the index composition is based on the actual distribution of services purchased by a representative bank client instead of imposing equal weights.[7] We scale the fee index by total deposits per capita in a given country to capture both the effect of a purchasing power parity adjustment as well as an indication of the general development of the country's banking sector.

The use of a fee index has several important advantages compared to the use of individual fees. Most critically, this approach is robust to differences in banks' strategies for pricing their portfolios of services. Within the category of core day-to-day services there exists at least four broad pricing approaches (account-based, packaged-based, transaction-based and indirect revenue-based[8]), which differ in how banks generate revenues from comparable portfolios of services. Two banks may charge a completely different price for a given service while the total price of a specified set of services may be exactly equal due to cross-subsidization within the banks' portfolios. Thus, a well-specified index of the total price of a typically-consumed bundle of services can clearly convey better information about the international differences in the costs of basic retail bank services than any of the individual fees.

[6] Brewer and Jackson (2006) use an equally-weighted index of three types of deposit rates.
[7] The exact composition of the index is available upon request or at http://home.cerge-ei.cz/hanousek/fees.
[8] This classification is used by Capgemini, EFMA and ING (2005).

The general framework used to build our empirical model consists of four main factors: (1) the cost of providing fee-related services, (2) competition, (3) regulation, and (4) demand-side (client-related) factors. The cost of providing fee-related services influences the fee level even under marginal cost pricing, i.e. under perfect competition. Competition and regulation determine the deviation of fees from marginal costs even in a single product environment. Finally, client-related factors account for the deviation from marginal cost pricing due to banks offering multiple products (the basic services represent only a subset of these products).

We follow Hannan (2006) and include bank size measured by total bank assets. The bank size can be expected to be a good proxy for many cost factors but only within a given country and during a certain period of time. As our dataset includes a heterogeneous mix of countries, we must control for labor costs and technology level, which can vary significantly among countries and over time. We do this by including the individual effect and a proxy for the level of the labor intensity of the banks' operations measured by personnel expenses normalized by the bank's assets. Furthermore, we control for the bank's riskiness by including the share of common equity in total bank assets, as recommended by Brewer and Jackson (2006).

To control for potentially huge differences in the cost of providing payment services implied by the degree to which each country’s banks rely on cashless payments, we include a proxy for cashless payments measured by the number of payment cards issued in a country per million inhabitants.

To measure the effect of competition on the level of fees we use the market share of the top five banks as an indicator of industry concentration in the banking

industry. As part of the sensitivity analysis, we also control for non-banking competition by using the measure of total assets managed by insurance companies, investment funds and pension funds.[9]

Different countries have different regulatory measures, some of which have a direct impact on basic bank services. Although hypothesizing the effects of these differing regulations is difficult, controlling for this significant source of external influence is clearly important. It is natural to expect that tighter regulation could mean a less competitive banking sector and, thus, greater pricing power for banks. Regulation can also target fees directly, however, in which case tighter regulation could lead to lower fee levels. To control for the effect of regulation we include the Heritage Foundation's Economic Freedom Index of regulation for the given country.

On the demand side (client-related factors), as a result of a multi-product nature of the pricing process, a typical bank offers at least two types of products: basic (account management, payments, cash utilization, etc.) and intermediation services (deposit and credit services reflected for example by the spread between the interest rates on deposits and loans). These products are clearly connected. When a client wants to get credit from a bank she must first have an account there—i.e. she needs to buy a basic service, too. In such a context, basic services

[9] As an alternative we could use a more direct measure of competition, the Panzar-Rosse H-statistics (based on Rosse and Panzar (1977) and Panzar and Rosse (1982, 1987)) defined as the sum of the elasticities of the bank's revenues with respect to input prices (H<=0 implies monopoly/cartel, 0<H<1 implies oligopoly/monopolistic competition, H=1 implies perfect competition). Unfortunately, the data on the H-statistics are not easily available for the countries and the time period in our sample (furthermore, the methodology of H-statistics estimation differs among authors); a rigorous analysis with the H-statistics is thus left for further research. As a preliminary step, we estimated the model with the historical values of H-statistics from Bikker, Spierdijk and Finnie (2007) and received a positive effect of H-statistics on the normalized fees. For a discussion of the recent use of the Panzar-Rosse H-statistics see for example Bikker, Spierdijk and Finnie (2007).

may be used as a loss-leader and, thus, cross-subsidization effects may influence the level of fees for these services.

Since potential cross-subsidization among the main types of bank services may significantly affect the level of fees (which can be understood as the price of the basic services), we follow the existing literature in suggesting the existence of the link between net interest margins and fee income (e.g. Lepetit, et al. (2008) or Demirguç-Kunt, Laeven and Levine (2004)), and include the net interest margin as a control for the connection to the intermediation services.

Based on the rationale above, the estimated equation can be expressed as (for bank i, country j and time t):

$$Y_{ijt} = \alpha_i + \beta_1 ASSETS_{it} + \beta_2 CASHLESS_{jt} + \beta_3 EASSETS_{it} + \beta_4 NIM_{it} + \beta_5 MSHARE_{jt} + \beta_6 PERSON_{it} + \beta_7 REG_{jt} + \varepsilon_{it,} \quad (1)$$

where Y_{ijt} stands for the bank fee index relative to the total bank deposits (from non-financial institutions) in the bank's country per capita (alternatively we use the fee index relative to GDP per capita in the section "Sensitivity analysis"), α_i is the bank's fixed effect, $ASSETS_{it}$ are the bank's total assets, $CASHLESS_{jt}$ is the share of non-cash payments on total payments measured by the number of payment cards issued in the bank's country, $EASSETS_{it}$ is the bank's share of common equity to total assets, NIM_{it} is the net interest margin, $MSHARE_{jt}$ is the market share of the top five banks in the given country, $PERSON_{it}$ is the bank's share of personnel expenses on total assets and REG_{jt} is the regulatory strength measured by the Economic Freedom Index of regulation.

Data

Our data come from three sources. The unique bank-specific data on the fee levels have been provided by Scott and Rose, s.r.o., a market research firm with long-term experience analyzing the Central European banking industry. The data on other bank-specific variables come from the Bankscope database, while the data on the country-specific macroeconomic variables are from European Central Bank statistics. The data cover five Central European countries (Austria, the Czech Republic, Hungary, Poland and Slovakia) over the period 2005 to 2007.

As we have already discussed, data on fee levels are in the convenient form of fee indices. The composition of the index created by Scott and Rose, s.r.o. is based on the actual behavior of a representative client in Slovakia (the choice is robust to the other countries due to consumption similarities in the region). Each of the main categories of services/activities is assigned a weight calculated as the average frequency/intensity of its use on the aggregate level, based on the total purchases of retail bank services in the country.[10]

[10] The list of services/activities included in the index, as well as the values of the respective weights, are available upon request or at http://home.cerge-ei.cz/hanousek/fees.

Table 1: Characteristics of the banks in the dataset

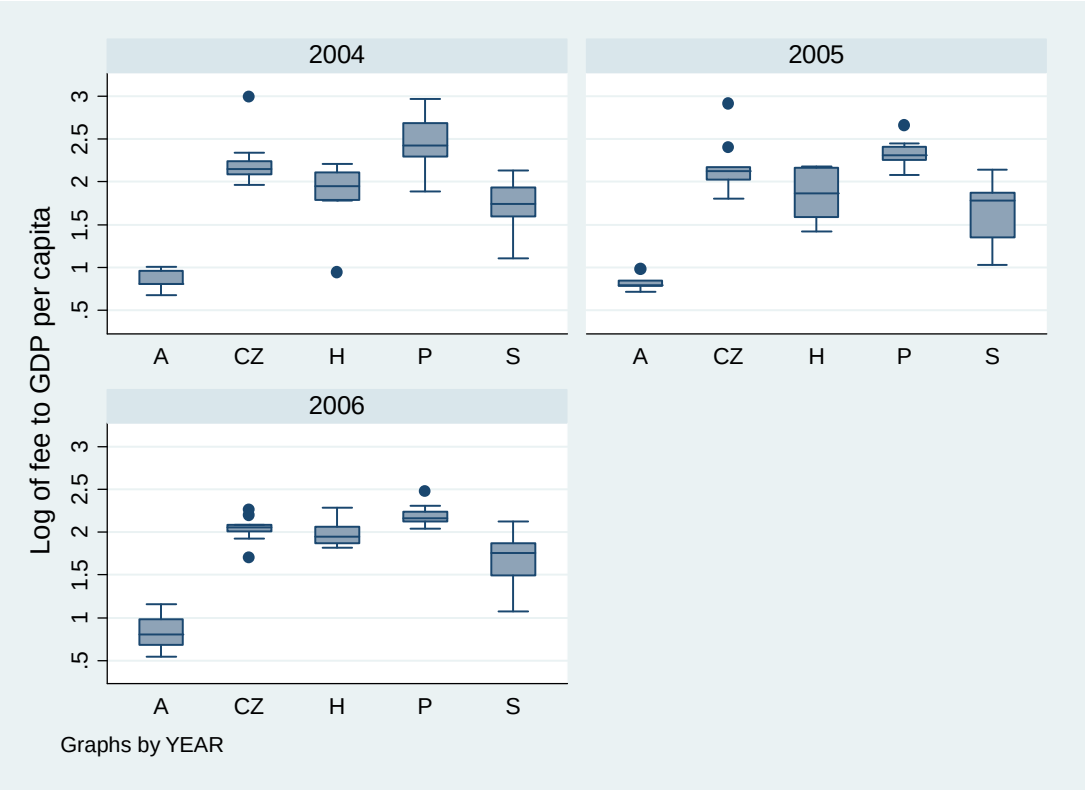
Year	Austria	Czech Republic	Poland	Slovakia	Hungary
Number of banks in the dataset					
2004	5	10	10	11	6
2005	5	10	10	11	7
2006	5	9	10	10	7
Total assets of banks in the dataset (mil. EUR) (share of total assets of credit institutions in the country in brackets)					
2004	434299 (68%)	69407 (80%)	89130 (63%)	23067 (75%)	47763 (70%)
2005	518100 (72%)	82897 (82%)	100370 (61%)	30845 (82%)	55630 (71%)
2006	569822 (72%)	96556 (84%)	112888 (60%)	32723 (78%)	70620 (75%)

Source: Authors' computations. Detailed cross-tabulation by country and year are available upon request or at http://home.cerge-ei.cz/hanousek/fees.

Table 1 illustrates the relative size of the assets held by banks in the different countries in our dataset. We do not consolidate by bank holdings, i.e., assets held by a Czech bank that are fully controlled by an Austrian bank are for this analysis considered to be controlled by the Czech bank. The table clearly shows the dominant size of the Austrian banks relative to their counterparts from the other countries in the dataset.

Figure 2 below depicts the vast difference between the fee levels in Austria and those of the other countries in the sample.

Figure 2: Log of fees to GDP per capita by country and year



Source: Authors' computations. Additional graphs and tabular statistics are available upon request or at home.cerge-ei.cz/hanousek/fees.

Table 2: Overall summary statistics

Variable	Description of the variable	No. of observations	Mean	Std. Dev.	Min	Max
Y	Log of fees to total deposits in a country per capita	126	1.9	0.5	0.5	3.0
$\bar{Y}$	Log of fees to GDP per capita	126	2.4	0.7	0.5	3.8
ASSETS	Total assets of a bank	127	18,4	35,5	455.8	181,7
CASHLESS	Number of payment cards issued per million inhabitants	129	0.73	0.16	0.47	1.13
EASSETS	Common equity to assets of a bank	125	8.4	3.7	0.1	25.6
NIM	Net interest margin	127	0.03	0.01	0.01	0.07
MSHARE	Top 5 banks' market share	129	57.2	8.9	43.8	67.7
HHI	Herfindahl-Hirschman Index	129	892.7	235.9	534.0	1,155
PERSON	Personnel expenses per assets of a bank	126	0.01	0.01	0.00	0.04
REG	Economic Freedom Index (Regulation)	129	51.6	5.3	50.0	69.0
LLPR	Provision for loan losses / Profit before provisions and taxes	116	18.7	45.3	-249.2	330.4

Source: Authors' computations. Additional cross-tabulation by country and year are available upon request or at home.cerge-ei.cz/hanousek/fees.

Table 2 shows that for each variable and year we have time series and cross sectional variability that can be used for identifying factors determining fee levels.[11]

[11] The exact definitions and sources of the individual variables used in the analysis are given in Table A.1 in the Appendix.

Results

Estimation results are reported in Table 3. The negative sign of CASHLESS confirms the expected negative relationship between the degree of reliance on cashless (lower cost) payment services and the fee level. The positive significant coefficient of MSHARE supports the SCP hypothesis of a positive relationship between concentration and prices. The positive significant coefficient of EASSETS proves the importance of controlling for the bank's riskiness suggested by Brewer and Jackson (2006),[12] and finally, the positive significant value of the PERSON coefficient confirms the importance of controlling for international differences in the labor intensity and technological level of the banks' operations.

The insignificance of ASSETS should not be surprising since much of ASSETS' role as a proxy for cost factors is captured by the fixed effects. ASSETS would arguably become significant under a more dynamic specification capturing the growth of bank assets. Although our dataset includes countries with maturing banking sectors, we did not observe this dynamic growth due to the limited time dimension of the dataset.

[12] Our positive sign is in line with the negative one received by Brewer and Jackson (2006) as they are studying the impact on deposit interest rates instead of fees.

Table 3: Regression results (all observations)

Regression	(1)
Dependent variables	Log of fees to total deposits per capita
ASSETS (Total bank assets)	9.39e-07 (0.33)
CASHLESS (No. of payment cards per mil. inhabitants)	-1.005 *** (-3.04)
EASSETS (Common equity to total assets)	0.047 ** (2.16)
NIM (Net interest margin)	-6.828 (-0.91)
MSHARE (Top 5 banks' market share)	0.039 ** (2.18)
PERSON (Personnel expenses per total assets)	46.076 ** (2.45)
REG (Economic Freedom Index)	0.004 (1.04)
Intercept	-0.141 (-0.12)
Estimation procedure	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35
N	122

Note: *t*-statistics are presented in brackets. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Sensitivity analysis

In order to check the robustness of our results, we estimate variants of the model with alternative measures of the main explained or explanatory variables and also with alternative exclusions of potential outliers. The estimation procedure remains the fixed effects specification as the Hausman test rejects a random effect specification at the 1 percent significance level in all cases.

We first run the same regression as above, but with an alternative dependent variable in the form of the fee index scaled by GDP per capita. The results of the regression are reported in Column 2 in Table 4 (Column 1 reports the original results for comparison). CASHLESS ceases to be significant, but this can arguably be caused by a relatively strong relationship between the CASHLESS and PERSON variables, which are both related to the development of the banking sector in a given country. The fit of the regression measured by the within R squared also decreases. The coefficients of the significant variables remain very similar.

Table 4: Regression results (all observations, alternative dependent variable)

Regression	(1)	(2)
Dependent variables	Log of fees to total deposits per capita	Log of fees to GDP per capita
ASSETS (Total bank assets)	9.39e-07 (0.33)	1.37e-06 (0.46)
CASHLESS (No. of payment cards per mil. inhabitants)	-1.005 *** (-3.04)	-0.528 (-1.52)
EASSETS (Common equity to total assets)	0.047 ** (2.16)	0.052 ** (2.26)
NIM (Net interest margin)	-6.828 (-0.91)	-10.015 (-1.27)
MSHARE (Top 5 banks' market share)	0.039 ** (2.18)	0.050 *** (2.63)
PERSON (Personnel expenses per total assets)	46.076 ** (2.45)	48.933 ** (2.48)
REG (Economic Freedom Index)	0.004 (1.04)	0.005 (1.28)
Intercept	-0.141 (-0.12)	-1.690 (-1.35)
Estimation procedure	Bank specific fixed effects	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35	0.27
N	122	122

Note: *t*-statistics are presented in parentheses. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Next, we exclude ASSETS from the regression because it is not significant and much of its role in a fixed effect model is arguably captured by the fixed effects. The results, reported in Column 2 in Table 5, show that the exclusion of ASSETS does not have an important effect on the value of the remaining coefficients, the significance of the variables or the regression fit (Column 1 reports the regression with ASSETS for comparison).

Table 5: Regression results (all observations, ASSETS excluded)

Regression	(1)	(2)
Dependent variables	Log of fees to total deposits per capita	Log of fees to total deposits per capita
ASSETS (Total bank assets)	9.39e-07 (0.33)	Not included
CASHLESS (No. of payment cards per mil. inhabitants)	-1.005 *** (-3.04)	-0.985 *** (-3.05)
EASSETS (Common equity to total assets)	0.047 ** (2.16)	0.047 ** (2.20)
NIM (Net interest margin)	-6.828 (-0.91)	-6.958 (-0.94)
MSHARE (Top 5 banks' market share)	0.039 ** (2.18)	0.039 ** (2.20)
PERSON (Personnel expenses per total assets)	46.076 ** (2.45)	44.744 ** (2.46)
REG (Economic Freedom Index)	0.004 (1.04)	0.004 (1.05)
Intercept	-0.141 (-0.12)	-0.121 (-0.10)
Estimation procedure	Bank specific fixed effects	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35	0.35
N	122	122

Note: *t*-statistics are presented in parentheses. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

We further report the results of the same regression as in the previous case[13] (without ASSETS) but after the exclusion of e-Banka, which in this time used a specific distribution channel that relied almost exclusively on internet banking. The results, reported in Column 2 in Table 6, show that the exclusion of e-Banka has only a marginal effect on the regression results (Column 1 shows the regression with e-Banka for comparison).

Table 6: Regression results (e-Banka excluded, ASSETS excluded)

Regression	(1)	(2)
Dependent variables	Log of fees to total deposits per capita	Log of fees to total deposits per capita
CASHLESS (No. of payment cards per mil. inhabitants)	-0.985 *** (-3.05)	-0.986 *** (-3.00)
EASSETS (Common equity to total assets)	0.047 ** (2.20)	0.047 ** (2.18)
NIM (Net interest margin)	-6.958 (-0.94)	-6.973 (-0.91)
MSHARE (Top 5 banks market share)	0.039 ** (2.20)	0.039 ** (2.16)
PERSON (Personnel expenses per total assets)	44.744 ** (2.46)	44.796 ** (2.34)
REG (Economic Freedom Index)	0.004 (1.05)	0.004 (1.04)
Intercept	-0.121 (-0.10)	-0.097 (-0.08)
Estimation procedure	Bank specific fixed effects	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35	0.35
N	122	120

Note: *t*-statistics are presented in parentheses. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

[13] We also estimated the model with the Transparency International Corruption Perceptions Index instead of the Economic Freedom Index. However, the estimated coefficient of this variable was also not significant (furthermore, the coefficient of CASHLESS also ceased to be significant, which was arguably caused by the high correlation between the Transparency International Corruption Perception Index and CASHLESS).

Since Austria is arguably the source of a great portion of the variation in our data, it is interesting to assess how much the results change if we exclude Austrian banks. The results, reported in Column 2 in Table 7, show that the exclusion of the Austrian banks leaves the values of the parameters at a similar level but decreases the significance of CASHLESS and EASSETS (Column 1 shows the regression with all observations for comparison). The lower significance of CASHLESS is intuitive given the large difference in the value of CASHLESS between Austria and the other countries in the dataset. Thus, our results seem robust even to the exclusion of the Austrian banks.

Table 7: Regression results (Austrian banks excluded, ASSETS excluded)

Regression	(1)	(2)
Dependent variables	Log of fees to total deposits per capita	Log of fees to total deposits per capita
CASHLESS (No. of payment cards per mil. inhabitants)	-0.985 *** (-3.05)	-0.872 ** (-2.57)
EASSETS (Common equity to total assets)	0.047 ** (2.20)	0.043 * (1.85)
NIM (Net interest margin)	-6.958 (-0.94)	-5.218 (-0.68)
MSHARE (Top 5 banks' market share)	0.039 ** (2.20)	0.045 ** (2.38)
PERSON (Personnel expenses per total assets)	44.744 ** (2.46)	54.482 ** (2.61)
REG (Economic Freedom Index)	0.004 (1.05)	0.003 (0.74)
Intercept	-0.121 (-0.10)	-0.530 (-0.41)
Estimation procedure	Bank specific fixed effects	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35	0.38
N	122	107

Note: *t*-statistics are presented in parentheses. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

In the next step, we include loan loss provisions scaled by net profit as an additional variable in the model. This variable could be understood as a proxy measure of the quality of the bank portfolio and/or as an imperfect proxy for the degree of asymmetric information or quality of loans the given bank is facing. Internationally harmonized regulatory systems require banks to create loan loss provisions in a volume reflecting the expected repayment of loans. Results of the modified regressions are presented in Table 8. The significant and positive effect of the new variable supports the hypothesis that a lower quality of loans (or a higher degree of asymmetric information) is associated with higher fees.

Table 8: Regression results (all observations, ASSETS excluded, LLPR included)

Regression	(1)	(2)
Dependent variables	Log of fees to total deposits per capita	Log of fees to total deposits per capita
CASHLESS (No. of payment cards per mil. inhabitants)	-0.985 *** (-3.05)	-0.852 ** (-2.60)
EASSETS (Common equity to total assets)	0.047 ** (2.20)	0.046 * (1.78)
NIM (Net interest margin)	-6.958 (-0.94)	-9.067 (-1.22)
MSHARE (Top 5 banks' market share)	0.039 ** (2.20)	0.031 (1.64)
PERSON (Personnel expenses per total assets)	44.744 ** (2.46)	52.003 *** (2.78)
REG (Economic Freedom Index)	0.004 (1.05)	0.002 (0.61)
LLPR (Loan loss provisions to profit)	Not included	0.001 * (1.92)
Intercept	-0.121 (-0.10)	0.325 (0.27)
Estimation procedure	Bank specific fixed effects	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35	0.35
N	122	113

Note: *t*-statistics are presented in parentheses. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

In Table 8 and in all earlier specifications we always use MSHARE as a measure of the degree of competition in the given banking market. In Table 9 we present the sensitivity of the chosen measure for banking competition, especially market share versus the Herfindahl-type index. Column 2 of Table 9 shows the results after exchanging MSHARE for HHI (i.e. the Herfindahl-Hirschman Index as in Hannan (2006)) and Column 3 shows the results with MSHARE and after including also total assets managed by insurance companies, investment funds and pension funds scaled by total bank assets in the country (OTHCOMP) as a proxy for non-banking competition. Although the inclusion of OTHCOMP makes both OTHCOMP and MSHARE insignificant, the two variables are jointly significant.

Table 9: Regression results (all observations, ASSETS excluded, alternative measures of competition)

Regression	(1)	(2)	(3)
Dependent variables	Log of fees to total deposits per capita	Log of fees to total deposits per capita	Log of fees to total deposits per capita
CASHLESS (No. of payment cards per mil. inhabitants)	-0.985 *** (-3.05)	-1.092 *** (-3.23)	-1.010 ** (-2.52)
EASSETS (Common equity to total assets)	0.047 ** (2.20)	0.046 ** (2.08)	0.053 ** (2.21)
NIM (Net interest margin)	-6.958 (-0.94)	-9.958 (-1.34)	-8.632 (-1.05)
MSHARE (Top 5 banks' market share)	0.039 ** (2.20)	Not included	0.043 (1.63)
PERSON (Personnel expenses per total assets)	44.744 ** (2.46)	44.218 ** (2.36)	51.673 ** (2.61)
REG (Economic Freedom Index)	0.004 (1.05)	0.004 (2.36)	-0.055 (-0.17)
HHI (Herfindahl-Hirschman Index)	Not included	0.001 (1.30)	Not included
OTHCOMP (Assets managed by non-banking institutions scaled by total bank assets)	Not included	Not included	0.087 (0.18)
Intercept	-0.121 (-0.10)	1.640 ** (2.47)	2.494 (0.16)
Estimation procedure	Bank specific fixed effects	Bank specific fixed effects	Bank specific fixed effects
R^2 (within, not counting the influence of fixed effects)	0.35	0.32	0.38
N	122	122	113

Note: *t*-statistics are presented in parentheses. The symbols *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Conclusions

This paper uses a unique dataset to analyze the determinants of retail bank fees in five Central European countries. A representative client approach is used to overcome the problems inherent in previous analyses of individual fees, namely

the potential bias caused by neglecting the possible links between the different fee-related products in the banks' portfolios.

The results of the analysis support the predictions of the Structure-Conduct-Performance hypothesis, i.e. that there is a positive relationship between industry concentration and prices. The results also confirm our hypothesis that the degree of reliance on cashless payments and the differences in labor intensity and technological level of the banks' operations are significant cost factors that determine fee levels. Our results are robust to alternative measures of the fee level and the main explanatory factors, as well as to the exclusion of Austria from the sample.

Based on the results of our analysis, it can be expected that in the future fee levels will converge in line with the convergence of economic fundamentals. Specifically, we can expect this to happen due to the convergence in the degree of competition through the continuing elimination of barriers to international competition between banks (for example, some of the countries in our dataset are expected to enter the Euro-zone soon), in the degree of reliance on cashless payments (with the increasing buying power of consumers) and the labor intensity and technological level of the banks' operations (with the continuing proliferation of more advanced technologies and the converging cost of labor).

The crucial message of our results is that the international differences in the levels of fees can be explained by fundamental economic factors. Our results oppose simplified explanations of the fee differences based on the banking market behaving as a pure cartel. Thus, the analysis in this paper also contributes to the continuing public debate about the implications of the prevailing fee levels for competition policy and the approach of regulatory institutions to banks.

References

L. Allen: The determinants of bank interest margins: A note. *Journal of Financial and Quantitative Analysis* 23, 1988, pp. 231-235.

J. Bain: Relation of Profit Rate to Industry Concentration, *Quarterly Journal of Economics* 65 (1951), pp. 293-324.

J. Bain: Barriers to New Competition: Their Character and Consequences in Manufacturing Industries, 1956. Cambridge, MA: Harvard University Pres.

A.N. Berger, T.H. Hannan: The Price-Concentration Relationship in Banking, *Review of Economics and Statistics* 71, 1989, pp. 291-299.

A.N. Berger, T.H. Hannan: The price-concentration relationship in banking: A reply. *Review of Economics and Statistics* 74, 1992, pp. 376-379.

W.J. Baumol: Contestable markets: an uprising in the theory of industry structure, *American Economic Review* 72, 1982, pp. 1-15.

W.J. Baumol, J.C. Panzar, R.D. Willig: Contestable Markets and the Theory of Industry Structure, Harcourt Brace Jovanovich, San Diego 1982.

J.A. Bikker, L. Spierdijk, P. Finnie: The Impact of Market Structure, Contestability and Institutional Environment on Banking Competition, *DNB Working Paper 156*, De Nederlandsche Bank 2007.

E. Brewer, W.E. Jackson: A note on the "risk-adjusted" price-concentration relationship in banking, *Journal of Banking and Finance* 30 (2006), pp. 1041-1054.

E. Brewer, T.H. Mondschean: An empirical test of the incentive effects of deposit insurance: The case of junk bonds at savings and loan associations. *Journal of Money, Credit and Banking* 26, 1994, pp. 146-164.

P.S. Calem, G.A. Carlino: The Concentration/Conduct Relationship in Bank Deposit Markets, *The Review of Economics and Statistics*, Vol. 73, No. 2 (1991), pp. 268-276.

S. Carbó, F. Rodríguez: The determinants of bank margins in European banking, *Journal of Banking and Finance* 31 (2007), pp. 2043-2063.

A. Demirguç-Kunt, L. Laeven, R. Levine: The Impact of Bank Regulations, Concentration, and Institutions on Bank Margins, *Policy Working Research Paper, The World Bank 2003*.

H. Demsetz: Industry Structure, Market Rivalry and Public Policy, *Journal of Law and Economics* 16 (1973), pp. 1-9.

T.H. Hannan: Retail Deposit Fees and Multimarket Banking, *Journal of Banking and Finance*, Vol. 30, 2006, pp. 2561-2578.

T.H. Hannan, A.N. Berger: The Rigidity of Prices: Evidence from the Banking Industry, *American Economic Review*, 81, pp. 938-945, 1991.

J. Hanousek, E. Kocenda, P. Ondko: The Banking Sector in New EU Member Countries: A Sectoral Financial Flows Analysis. *Czech Journal of Economics and Finance*, 57(5-6), 2007, pp. 200-224.

W.E. Jackson: The price-concentration relationship in banking: A comment. *Review of Economics and Statistics* 74, 1992, pp. 373-376.

T.S.Y. Ho, A. Saunders: The Determinants of Bank Interest Margins: Theory and Empirical Evidence, *Journal of Financial Economics* 9, 1981, pp. 47-73.

L. Lepetit, E. Nys, P. Rous, A. Tarazi: The expansion of services in European banking: Implications for loan pricing and interest margins, *Journal of Banking & Finance,* Vol. 32, Issue 11, 2008, pp. 2325-2335.

E.H. Mason: Price and Production Policies of a Large Scale Enterprise, *American Economic Review* 29 (1939), pp. 69-74.

J. Musil. 2007. Notes on Central Europe from Sociological Perspective, *Central European Journal of Public Policy*, Vol. 1: 1, pp. 8-29

J.N. Panzar, J. Rosse: Structure, Conduct and Comparative Statics, Bell Laboratories Economic Discussion Paper 1982.

J.N. Panzar, J. Rosse: Testing for 'Monopoly' Equilibrium, *Journal of Industrial Economics* 35, 1987, pp. 443-456.

S. Peltzman: The Gains and Losses from Industrial Concentration, *Journal of Law and Economics* 20 (1977), pp. 229-263.

S.A. Rhoades, R.D. Rutz: Market power and firm risk: A test of the quiet-life hypothesis. *Journal of Monetary Economics* 9, 1982, pp. 73-85.

J. Rosse, J.N. Panzar: Chamberlin versus Robinson: An Empirical Study for Monopoly Rents, *Bell Laboratories Economic Discussion Paper 1977*.

S. Shaffer: Patterns of competition in banking, *Journal of Economics and Business* 56 (2004), pp. 287-313.

K.P. Wong: On the determinants of bank interest margins under credit and interest rate risks, *Journal of Banking and Finance* 21, 1997, pp.251-271.

E. Zarruck: Bank margin with uncertain deposit level and risk aversion, *Journal of Banking and Finance* 13, 1989, pp. 797-810.

World Retail Banking Report, Capgemini, EFMA and ING 2005, 2006, 2007.

Corruption Perceptions Index 2004, 2005, 2006, Transparency International, Transparency International webpage.

Appendix

Table A.1 Definitions and sources for variables used in the analysis

Variable	Definition	Source
Y_{ijt}	Fee index of bank i in country j at time t / total bank deposits per capita in country j at time t	Scott and Rose, s.r.o. (fee index), ECB statistics (total deposits)
$\bar{Y}_{ijt}$	Fee index of bank i in country j at time t / GDP per capita in country j at time t	Scott and Rose, s.r.o. (fee index), ECB statistics (GDP)
$CASHLESS_{jt}$	Number of payment cards issued in a country j at time t per million inhabitants	ECB Statistics
$ASSETS_{it}$	Total assets of bank i at time t	Bankscope database
$EASSETS_{it}$	Common equity as a share of total assets of bank i at time t	Bankscope database
NIM_{it}	Net interest margin of bank i at time t = (interest income – interest expense)/total assets	Bankscope database
REG_{jt}	Economic Freedom Index of Regulation	The Heritage Foundation
$MSHARE_{jt}$	Market share of the top five banks in country j at time t	EU Banking Structures 2007, ECB
HHI_{jt}	Herfindahl-Hirschman index of industry concentration (the sum of the squared market shares of the individual banks in country j)	EU Banking Structures 2007, ECB
$OTHCOMP_{jt}$	Assets managed by insurance companies, investment funds and pension funds as a share of total assets of credit institutions in country j at time t	EU Banking Structures 2007, ECB
$PERSON_{it}$	Personnel expenses of bank i as a share of its assets	Bankscope database
$LLPR_{it}$	Provisions for loan losses as a percentage of net profit of bank i at time t	Bankscope database

Individual researchers, as well as the on-line and printed versions of the CERGE-EI Working Papers (including their dissemination) were supported from the following institutional grants:

- Economic Aspects of EU and EMU Entry [Ekonomické aspekty vstupu do Evropské unie a Evropské měnové unie], No. AVOZ70850503, (2005-2010);
- Economic Impact of European Integration on the Czech Republic [Ekonomické dopady evropské integrace na ČR], No. MSM0021620846, (2005-2011);

Specific research support and/or other grants the researchers/publications benefited from are acknowledged at the beginning of the Paper.

(c) Pavel Dvořák, Jan Hanousek, 2009

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical or photocopying, recording, or otherwise without the prior permission of the publisher.

Published by
Charles University in Prague, Center for Economic Research and Graduate Education (CERGE)
and
Economics Institute ASCR, v. v. i. (EI)
CERGE-EI, Politických vězňů 7, 111 21 Prague 1, tel.: +420 224 005 153, Czech Republic.
Printed by CERGE-EI, Prague
Subscription: CERGE-EI homepage: http://www.cerge-ei.cz

Editors: Directors of CERGE and EI
Managing editors: Deputy Directors for Research of CERGE and EI

ISSN 1211-3298
ISBN 978-80-7343-189-1 (Univerzita Karlova. Centrum pro ekonomický výzkum
a doktorské studium)
ISBN 978-80-7344-178-4 (Národohospodářský ústav AV ČR, v. v. i.)

CERGE-EI
P.O.BOX 882
Politických vězňů 7
111 21 Praha 1
Czech Republic
http://www.cerge-ei.cz