

**Banking Efficiency, Consolidation and Foreign Ownership:  
Evidence from the Polish Banking Market**

by  
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A thesis submitted to the European University Viadrina  
for the degree of Ph.D.  
in the Faculty of Economics

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Day of thesis defence: 31 January, 2005

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## **Acknowledgements**

The work of this thesis has been a challenging but enriching experience. I would like to thank many people that made this thesis a possible and enjoyable experience for me.

First of all, I would like to thank my supervisor Prof. Dr. Martin T. Bohl who offered me his trust and opportunity to complete this thesis. I am extremely grateful to him for his continuous support, patience and advice during my studies. I also thank him for encouraging me to attend summer schools and international conferences, which gave me an opportunity to meet other researchers and benefit from their comments and suggestions. I would also like to express my gratitude to my second supervisor, Prof. Dirk Schiereck. I appreciate very much his insightful and valuable comments about my work.

The completion of the thesis would have been impossible without the financial support from the Postgraduate Research Programme “Capital Markets and Finance in the Enlarged Europe” sponsored by Stiftungsfond Deutsche Bank im Stifterverband für die Deutsche Wissenschaft.

I would like to thank my colleagues and friends at the European University Viadrina, who supported and listened to me during the long four years of my work on this thesis. Especially, I would like to thank Emilia Jurzyk for cheering me up when I was down and sharing my happy moment. I am also grateful to Shauna Selvarajah for proofreading my thesis one thousand times and good laughs that we had during our discussions. I also thank my other fellow graduate students, particularly Gunter Fischer, Vasyl Golosny, Cristina Tudor, Dobromir Tzotchev, Denitsa Vigenina, Svitlana Voronkova, Jędrzej Białkowski, Sergej Novik, Dobromil Serwa, and Rozalia Pal. I hope that our lives cross again together.

I will always remember the inspiring environment of the European Investment Bank, where I spent three months as a consultant and where I made my decision about the topic of my thesis. I am particularly grateful to Rien Wagenvoort, Armin Riess, and Kristian Uppenberg.

The final part of this thesis was written during my internship at the European Commission. I am very grateful to Jose Leandro for his interest in my thesis and giving me the chance to apply my knowledge that I have acquired during my studies.

Last, though equally important, my gratitude goes to all the people dear to me as close or far away they might be.

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## **Chapter 1: Introduction**

The Polish banking industry has gone through an impressive restructuring process in the last fifteen years. In 1989 a two-tier structure of the Polish banking system was established, with nine regional commercial banks and the independent National Bank of Poland (NBP). In May 2004, after Poland's accession to the European Union (EU), the Second EU Directive on Banking came into force, which made Polish banks completely open for the competition with their EU peers. Between these two events, a number of successful reforms were implemented such as alignment of the Polish banking legislation with the EU requirements, restructuring of the banking industry with its subsequent privatization, increasing market discipline through floating many bank shares on the Warsaw Stock Exchange (WSE). The above reforms have strengthened the banking industry and improved prudential regulation and supervision.

In the present thesis we primarily focus on the impact that foreign ownership had on the development of the financial sector in Poland. Currently, 76.7% of the banks' capital and 67.8% of the total banking assets are controlled by foreign investors. However, foreign investors were allowed to purchase controlling stakes in Polish banks relatively late in comparison to other Central and Eastern European countries. When privatization started in 1993, foreign banks were entitled only to minority shares whereas controlling stakes remained with the treasury. This was motivated by the fear that financially weak Polish banks were not able to face competition from their foreign rivals and the general stance that Polish banking sector should remain in the national hands. However, as Poland embarked on the integration process into the EU, the government position on foreign banks ownership was relaxed. In 1998 a new Act on Banking came into force, which removed all restrictions for foreign banks. The concept of privatization changed as well and the government started to seek reputable foreign banks in order to collect large privatization revenues. The high minimum capital requirement of 5 million Euro accelerated the involvement of foreign banks, since domestic banks could not raise such large amounts of money on the local market.

The thesis consists of four separate papers that can be read individually. They extend four streams of the empirical literature on the development of transition banking markets: impact of foreign ownership on banks' efficiency, stock market reaction to foreign banks' acquisitions, costs and benefits of mergers and acquisitions, and the bank lending channel of the monetary policy transmission. A number of our findings are in line with the existing literature on banking in transition economies, whereas we also document new results that shed light on several aspects overseen by the previous research.

In the first paper “Efficiency of the Polish Banking Industry: Foreign versus Domestic Banks” we analyze the efficiency of foreign and domestic banks. The literature on this subject is very vast and most studies conclude that foreign banks enjoy higher efficiency in transition countries than their domestic peers (Bonin et al. (2004), Isik and Hassan (2002), Grigorian and Manole (2002), Hasan and Marton (2003), Bhattacharyya et al. (1997)). These findings support the hypothesis that foreign ownership brings a number of advantages for banking institutions in countries where it replaces state ownership.<sup>1</sup> In this case foreign owners enhance banks’ efficiency by reducing the importance of directed credit and introducing better risk management practices, bringing access to cheaper resources and streamlining banking operations.

Our study contributes to the above literature by addressing a few new aspects. First, unlike other studies that consider foreign banks as a homogeneous group, we distinguish between greenfield banks, which have been set up as new entities, and takeover banks, which have resulted from the acquisition of formerly domestic institutions during the privatization process. Second, we are also interested to test whether foreign banks tended to pick more cost-efficient institutions, and thus their higher efficiency would be inherited, rather than gained. Third, following Berger et al. (2000), we take into account the home country of foreign banks in order to test the limited global advantage hypothesis. Finally, it is noteworthy that our sample covers 95% of the total banking assets, which makes it the most comprehensive database on the Polish banking system<sup>2</sup>.

Our findings that foreign banks exhibit higher efficiency than their domestic peers are consistent with other studies for transition and developing economies. However, the results of the multivariate regression analysis indicate that the higher efficiency of foreign banks has been due to the successful performance of greenfield banks. This could indicate that they have been better in managing their costs and screening borrowers. Alternatively, the findings might reflect a different mix of customers, with greenfield banks servicing multinational corporations and Polish blue-chip companies. Foreign banks that have acquired domestic banks do not appear to have enhanced their efficiency, which is an alarming sign, particularly in light of their acquisition of domestic banks with higher allocative efficiency. Our finding that Dutch banks have achieved higher efficiency than banks from other countries gives support to the hypothesis of the limited global advantage.

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<sup>1</sup> Interestingly, the efficiency literature on developed countries gives the opposite results. Foreign banks that enter already developed banking markets perform worse than their domestic counterparts due to additional costs of overcoming informational asymmetries.

<sup>2</sup> The traditionally used BankScope database employed by Grigorian and Manole (2002), for example, provides data on 25% and 45% of the total banking assets in Poland for years 1995 and 1998, respectively.



The second paper entitled “Foreign Acquisitions and Industry Wealth Effects of Privatisation: Evidence from the Polish Banking Industry” deals with the same issue as the first one; however the benefits of foreign ownership are analyzed with a different methodology. Whereas in the first essay, efficiency is analyzed with the help of the Data Envelopment Analysis applied to balance sheet and income statement data, in the second essay we assume that capital markets can predict the results of foreign acquisitions and, hence, we look at the stock market reaction to foreign bank acquisitions.

The existing literature that investigates cross-border acquisitions provides only weak evidence in favour of a positive impact of foreign acquisitions on target banks. However, these studies focus on developed countries and the results cannot be applied to a transition economy like the Polish one for a number of reasons. Most importantly, there may be opportunities for foreign investors to improve efficiency of privatized banks and, hence, earn high profits and gain a large market share when they enter an uncompetitive and underdeveloped banking market. However, the seller in transition economies is the government who could interfere in the privatization process itself and even exert influence on the governance of already privatized banks, decreasing the benefits of foreign ownership.

In the paper we analyse the reaction of Polish bank stocks to acquisition by foreign investors, as well as look at the impact of foreign acquisitions on non-participating banks. The novel aspect of this study is the analysis of the wealth impact of foreign acquisitions on remaining domestic banks. The theoretical literature does not give a straightforward answer about the consequences of a high presence of foreign banks for their domestic peers. On the one hand, we can expect that high foreign bank ownership would enhance efficiency and stability of the banking market benefiting also the remaining domestic banks. On the other hand, domestic banks might incur additional costs due to stronger competition, at least in the short-run. Moreover, foreign banks might “cherry pick” the best borrowers forcing domestic banks to lend to riskier clients.

Our results indicate that foreign acquisitions created wealth for participating banks in the short-run. It is noteworthy that deals where large shares had been transferred into foreign control exhibited significantly higher abnormal returns. This finding is in line with the results produced by studies employing other methodologies (Hasan and Marton (2003), Isik and Hassan (2002), Grigorian and Manole (2002), Claessens et al. (2001), Bhattacharyya et al. (1997)). When foreign acquisitions were announced, the shares of non-participating banks also experienced positive wealth effects in the short-run. The effect was much higher for the

non-participating domestic banks, indicating that their shareholders anticipated foreign acquisition of the remaining domestic institutions.

The third paper “Consolidation of the Polish Banking Sector: Consequences for the Banking Institutions and the Public” was motivated by the consolidation process in Poland. Up to 27% of the total banking assets were involved in merger and acquisition (M&A) activity, which added to the systemic risk of the financial system. Therefore a comprehensive analysis was warranted to analyze benefits and costs of this process. Following Rhoades (1998) and Avkiran (1999) the study applies three methodologies: event study, financial ratio analysis, and Malmquist indices.

While there has been considerable research on the effects of M&As, no agreement has been reached, as to whether or not, the ongoing consolidation process in the world has benefited the financial industry (see Berger et al. (1999) for a comprehensive survey). The predominant part of the existing research focuses on the US, and to a lesser degree on European markets. No research, to our knowledge, has yet been carried out on accession countries. Hence, this study is the first attempt to fill this gap and analyze the consolidation process in Poland.

Our findings indicate that the level of integration of the consolidated institutions plays a pivotal role. Five out of seven mergers have improved their profitability either through cost cutting or improvements in total factor productivity or increased market power. At the same time, our study reveals that acquiring banks have concentrated on gaining larger market power, explaining their deteriorating profitability and cost ratios. The acquired banks have not only not improved their efficiency, but have even experienced deteriorating performance. This fact proves that a simple change of ownership and recapitalization without structural change is not enough to render a bank more efficient.

The consequences of consolidation to the public are mixed. On the one hand, the gains of the increased efficiency were not passed to depositors in terms of better customer service or higher interest rates. On the other hand, consolidation has helped to purge the banking market of distressed institutions. The fact that this has been done mainly through consolidation, rather than liquidation, is beneficial to the public because no state money has been spent in the liquidation process, and the trust of the depositors has not been put to test.

In the fourth paper “Does the Bank Lending Channel Work in a Transition Economy? A Case of Poland” we investigate the role of Polish banks in the transmission of the monetary policy. After Poland’s accession to the EU in May, 2004, the adoption of Euro and single monetary policy becomes the next step in the European integration. Although it is plausible to

assume that the accession of Poland to the EMU will significantly influence the monetary policy transmission process, changes in the financial structure are likely to occur only gradually. Therefore, current findings might serve as a good indicator of the future response of bank lending to changes in the ECB's monetary policy stance, and therefore will be important for the decision about the timing of the Euro adoption.

Similar to Kashyap and Stein (1995), the underlying idea of our approach was to check whether banks' reaction to the monetary policy differs depending on certain bank characteristics. We looked whether banks' credit supply depends on size, liquidity and capitalization of a bank. Recognizing high level of foreign penetration in the banking system, we extend the existing literature by studying whether greenfield and takeover banks have an impact on the credit supply.

In the paper we did not find support for the bank lending channel of the monetary policy transmission in Poland. However, our findings suggest that banks' ownership matters for their lending decision. Greenfield banks exhibit particularly strong loan growth. Even though they do not react heterogeneously to the changes in the monetary policy stance of the National Bank of Poland, their lending is positively affected by the tightening of the monetary policy in their home countries and appreciation of Polish zloty. However, this effect would be partly lost if Poland were a member of the EMU and was subject to the common monetary policy.

The thesis confirms that foreign ownership brings a number of positive developments to transition countries, such as much needed capital and know-how. Moreover, the findings indicate that all banks, not only those acquired by foreign investors, benefit from increased presence of foreign investors. However, we also discover that the results are mainly due to higher efficiency of greenfield banks and the fact that foreign investors target slightly more efficient institutions. Therefore, more research on other transition countries is warranted. Finally, we also document that foreign bank ownership has an impact on the conduct of the monetary policy.

## **Chapter 2: Efficiency of the Polish Banking Industry: Foreign versus Domestic Banks**

### **2.1. Introduction**

There has been an ongoing debate as to the role of foreign banks in Poland. The initial ideological stance of the government was to keep the banking industry “national”, because foreign capital was regarded as hostile to “Polish interests” (Balcerowicz and Bratkowski (2001)). Between 1993-1997 foreign banks were limited to greenfield operations or taking over distressed institutions, and were entitled to minority shares during the privatization process. As EU aspirations developed the restrictions on foreign bank entry and participation in the privatization process were repealed. Foreign banks have entered the Polish market either by establishing greenfield institutions or acquiring domestic banks. As a result the assets controlled by foreign banks<sup>3</sup> have increased from 15.3% of total banking assets in 1997 to 69.2% in 2001.

The literature on bank efficiency and the role of foreign banks is dominated by studies about the US, and to a smaller degree European, banking industries (Berger and Humphrey (1997)). Efficiency studies found that foreign banks in developed countries exhibited lower efficiency in comparison with domestic banks. However, banks from certain countries were able to operate more efficiently than domestic banks in other developed countries (Berger et al. (2000)). Even though the research on transition and developing markets lags far behind, the findings support the conclusion that foreign banks in these countries succeeded in exploiting their comparative advantages and show higher efficiency than their domestically owned counterparts (Isik and Hassan (2002); Grigorian and Manole (2002); Hasan and Marton (2000); Bhattacharyya et al. (1997)). One of the proposed explanations is that foreign banks enter developing and developed countries for different reasons. In particular, foreign banks do not just follow their customers into developing markets, but seem genuinely interested in exploiting local opportunities (Clarke et al. (2001)).

We would like to contribute to the above literature by providing evidence on the efficiency of the Polish banking industry with the emphasis on the domestic versus foreign banks debate. To do so, we employ Data Envelopment Analysis and estimate cost, allocative, technical, pure technical and scale efficiency. Then, we perform a number of parametric and non-parametric tests to investigate whether domestic and foreign banks come from the same population. Finally, we analyze how ownership structure and different bank characteristics, such as capitalization, problem loans ratio, assets growth, size, and volatility of returns, influence our efficiency estimates.

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<sup>3</sup> A bank is defined as foreign if more than 50% of its equity is owned by foreign investors.

Our paper differs from the previous studies on transition economies in a few respects. First of all, our sample covers 95% of total banking assets, which makes it the most comprehensive database on the Polish banking system<sup>4</sup>. Second, unlike other studies that consider foreign banks as a homogeneous group, we distinguish between greenfield banks, which have been set up as new entities, and takeover banks, which have resulted from the acquisition of formerly domestic institutions during the privatization process. We are also interested to test whether foreign banks tended to pick more cost-efficient institutions, and thus their higher efficiency would be inherited, rather than gained. Finally, following Berger et al. (2000), we take into account the home country of foreign banks in order to test the limited global advantage hypothesis.

Our finding that foreign banks are more efficient than their domestic peers is consistent with the efficiency literature on transition economies. However, we also find that their higher efficiency is solely due to the better performance of greenfield banks. The evidence pertaining to takeover banks suggests that they acquired the more efficient institutions, but failed to enhance their efficiency further. Our findings imply that future studies should pay more attention to the differences between greenfield and takeover banks.

The paper is structured in the following way. Section 2.2 describes the evolving role of foreign banks on the Polish banking market. In Section 2.3 we present a survey of the existing literature on the efficiency of banking industries in emerging markets. Section 2.4 explains the methodology used in the study, namely Data Envelopment Analysis. Section 2.5 presents the data and Section 2.6 provides empirical results of the investigation. Finally, Section 2.7 draws some conclusions.

## **2.2. Evolving Role of Foreign Banks in the Polish Banking Industry**

Since the fall of communism the Polish banking market has gone through three stages<sup>5</sup>. The first stage of the transition between 1989-1992 was characterized by a very liberal licensing policy. This has spawned a number of new small private banks. During this stage not only was it easy for foreign banks to enter, but they were even encouraged by a number of incentives, such as tax holidays or permission to keep the equity in hard currency. Even though most foreign investors were reluctant to venture into the risky Polish market, some reputable banks followed their clients to Poland and established subsidiaries

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<sup>4</sup> The traditionally used BankScope database employed by Grigorian and Manole (2002), for example, provides data on 25% and 45% of the total banking assets in Poland for years 1995 and 1998, respectively.

(Creditanstalt, Citibank) or opened branches (ING Bank N.V. and Societe Generale). During this period the activities of foreign banks was limited to servicing foreign enterprises and they were not considered as competition for domestic banks.

Table 2.1. Summary Statistics of the Polish Banking Structure for the Years 1989-2001

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number of commercial banks <sup>1)</sup>	18	40	72	84	87	82	81	81	83	83	77	74	71
Number of foreign-owned banks	0	1	6	9	10	11	18	25	29	31	39	47	48
Number of private banks <sup>2)</sup>	0	22	47	63	58	53	54	57	68	70	70	67	64
Number of domestic (foreign) banks in the sample	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	38 (14)	35 (21)	31 (22)	21 (34)	10 (21)
Assets controlled by foreign banks (in %)	n.a.	n.a.	n.a.	n.a.	2.6	3.2	4.2	13.7	15.3	16.6	47.2	69.5	69.2
Capital controlled by foreign banks (in %)	n.a.	n.a.	n.a.	n.a.	2.2	3.7	7.6	20.9	24	24.7	50.2	77.6	80.2

1) Excluding banks declared bankrupt or under liquidation. Cooperative banks are also excluded.

2) The data for the years 1989-1992 includes new banks other than those directly owned by the National Bank of Poland or the State Treasury (those owned indirectly by the State Treasury are included). The data for years 1993-2001 includes all private domestic and foreign banks.

The liberal licensing policy was curtailed at the end of 1992. Moreover, conditional licensing was applied to foreign banks, meaning that a foreign bank could obtain a license only after agreeing to rehabilitate a distressed Polish bank. The privatization process started in 1993. Even though foreign investors were allowed to participate, they were entitled only to minority shares. The State Treasury usually retained the largest equity share and the government still played an active role in the governance of privatized banks, making the privatization process of those years for the most part incomplete (Abarbanell and Bonin (1997)). During the next few years there was a strong political will that the banking system should remain national, and in 1994 the government worked out a consolidation plan, according to which four out of six 100% state-owned institutions were asked to merge. After long discussions and the opposition of bank managers the result of this endeavor was the formation of PEKAO Group<sup>6</sup>.

The decisive factor for the development of the Polish banking sector was the signing of the association agreement with the European Union and becoming a member of the Organization for Economic Cooperation and Development. On January 1, 1998, a new Act on Banking and a new Act on the National Bank of Poland came into force. Restrictions on

<sup>5</sup> For a detailed description of the development of the Polish banking system see Balcerowicz and Bratkowski (2001).

foreign banks were removed. The concept of privatization changed as well and the government started to seek reputable foreign banks in order to collect large privatization revenues. The high minimum capital requirement of 5 million ECUs accelerated the involvement of foreign banks, since domestic banks could not raise such large amounts of money on the local market.

The year 1999 brought many changes to privatization and the restructuring process. During this year many large banks were privatized (Bank Przemyslowo-Handlowy SA, Bank Polska Kasa Opieki SA, Bank Zachodni SA) by foreign investors and some of the largest mergers took place, which involved 25% of the total banking assets. Another merger wave took place in 2001, when many greenfield banks merged with domestic banks that they had previously acquired. The privatization process is now almost complete. There were 71 commercial banks in Poland in 2001, among them 64 private banks and 48 owned by foreigners (see Table 2.1). Although there are a few remaining state banks that need further restructuring, they do not pose any systemic threat to the financial system.

### **2.3. Previous Empirical Findings**

Cost efficiency literature is growing very fast, but the vast majority of studies covers the US and other developed countries (for a good overview see a survey paper by Berger and Humphrey (1997); Goddard et al. (2001)). Research about emerging markets lags far behind, and, therefore, in this section we try to summarize existing studies on the efficiency of banking markets in developing countries. The most extensively studied developing countries are in Asia, where the markets of Thailand (Leightner and Knox Lovell (1998)), Korea (Gilbert and Wilson (1998)), Singapore (Rezvanian and Mehdian (2002)), Pakistan (Hardy and Bonaccorsi di Patti (2001)), and India (Bhattacharyya et al. (1997)) were analyzed. The changing environment of Turkey also attracted the attention of researchers (Isik and Hassan (2002); Denizer et al. (2000)). The study of Grigorian and Manole (2002) investigates a number of countries in Central and Eastern Europe and the Commonwealth of Independent States. Additionally, the banking markets of Hungary (Hasan and Marton (2000)), Croatia (Kraft and Tirtiroglu (1998)), Poland (Opiela (2001)), and Ukraine (Mertens and Urga (2001)) were studied.

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<sup>6</sup> On January 1, 1999, four state banks that were part of PEKAO group finally merged. When restrictions on foreign ownership were lifted, the majority share (52.09%) of the PEKAO Group (now called Bank Polska Kasa Opieki SA) was bought by a consortium of UniCredito Italiano SA and Allianz AG.

Most of the studies agree on the nature of the functions performed by banks and use the intermediation approach (Kraft and Tirtiroglu (1998); Rezvanian and Mehdiian (2002); Isik and Hassan (2002)). Others try to combine the production and the intermediation approaches by defining purchased funds as output and input (Hasan and Marton (2000)) or modeling banking technology in two stages, first the production and second the intermediation stage (Denizer et al. (2000)).

No consensus has been reached about the appropriate estimation methodology. Half of the studies use Data Envelopment Analysis (Grigorian and Manole (2002); Rezvanian and Mehdiian (2002); Denizer et al. (2000)), whereas others - Stochastic Frontier Analysis (Hasan and Marton (2000); Kraft and Tirtiroglu (1998); Mertens and Urga (2001)) or the Distribution Free Approach (Hardy and Bonaccorsi di Patti (2001); Opiela (2001)). There are also studies that used both, parametric and non-parametric, approaches to check for the robustness of results (Isik and Hassan (2002); Rezvanian and Mehdiian (2002)). Since banks in emerging markets operate in a very fast changing environment, most of the studies estimated frontiers for each year separately enabling the authors to see how liberalization and deregulation, which took place in most of the countries of interest, affected the efficiency of the banking sector. When estimation was performed on the panel data, it was due to the limited number of observations during some years (Hardy and Bonaccorsi di Patti (2001)).

Empirical results for developing countries yield lower levels of efficiency and bigger fluctuations over the years than studies conducted in developed countries. For example in Turkey cost efficiency was 78.2% in 1988 and dropped to 68.5% in 1996 (Isik and Hassan (2002)), in Pakistan the pre-reform period efficiency was 48.5% and climbed to 72.8% in the post-reform period (Hardy and Bonaccorsi di Patti (2001)). Grigorian and Manole (2002) report efficiency in the range of 23.7% in Belarus and 79.9% in the Czech Republic. In general, the figures were significantly lower than the equivalent 72% efficiency in the US (Berger and Mester (1997)).

The comparison of efficiency between foreign and domestic banks provides evidence that foreign banks in developing and transition countries have succeeded in capitalizing on their advantages and show a higher level of efficiency than their domestic peers (Bonin et al. (2004); Isik and Hassan (2002); Hasan and Marton (2000); Bhattacharyya et al. (1997)). Furthermore, several papers tested whether foreign and domestic banks came from the same population, in other words whether they operated in the same environment. These tests are especially important for efficiency studies in order to determine whether to construct separate or common frontiers for domestic and foreign banks. Parametric and non-parametric tests



usually failed to reject the null hypothesis that foreign and domestic banks came from the same population (Isik and Hassan (2002); Sathye (2001)).

#### **2.4. Methodology**

There is a longstanding debate on how to measure cost-efficiency of banking institutions. The cornerstone of the discussion constitutes the problem of choosing the appropriate methodology for constructing an efficient frontier that encompasses best-practice banks, so that subsequently other banks can be compared with this efficient benchmark. Broadly, the existing methodologies can be divided into econometric models (Stochastic Frontier Analysis, Thick Frontier Approach, and Distribution Free Approach) and a linear programming technique (Data Envelopment Analysis).

To measure the efficiency of Polish banks we employ Data Envelopment Analysis (DEA), which was developed by Charnes et al. (1978). This methodology was used by many recent studies (Isik and Hassan (2002); Rezvanian and Mehdian (2002); Sathye (2001); Denizer et al. (2000)) and is considered to be suitable for transition economies (Grigorian and Manole (2002)). Our preference for DEA is driven by many factors. The chief advantage of DEA is that it performs well with only a small number of observations, which is important for us since we want to assess efficiency separately for each year in order to detect effects of technological or regulatory changes. In fact, the number of observations used in our paper exceeds most banking efficiency studies that employ DEA<sup>7</sup>. Furthermore, no explicit functional form is imposed on the data and it operates well with assorted sizes of bank institutions. However, the disadvantage of using this method is its extreme sensitivity to outlying observations; therefore we will perform some sensitivity tests.

In order to measure efficiency we have to decide on the appropriate nature of banking activity. In the banking literature there are two competing theories: the production and intermediation approaches (Sealey and Lindley (1977)). Assuming that the main function performed by a bank is to intermediate funds between depositors and borrowers at the lowest possible cost, we apply, similar to many other studies, the intermediation approach (Gilbert and Wilson (1998); Kraft and Tirtiroglu (1998); Rezvanian and Mehdian (2002); Isik and Hassan (2002)).

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<sup>7</sup> Sathye (2001) describes rules of thumb used in DEA studies to determine the necessary number of observations. Some researchers state that sample size should exceed the product of the number of inputs and outputs, whereas others hold view that it should be three times bigger than the sum of the number of inputs and outputs.

DEA allows us to compute overall cost, technical, allocative, pure technical, and scale efficiency. Technical efficiency (TE) refers to the ability to produce the maximum outputs at a given level of inputs, or ability to use the minimum level of inputs at a given level of outputs. Allocative efficiency (AE) refers to the ability to select the optimal mix of inputs in light of given prices in order to produce a given level of outputs. The measure of overall cost efficiency (CA) is the product of technical and allocative efficiency. The TE measure can be further decomposed into pure technical efficiency (PTE) and scale efficiency (SE)<sup>8</sup>.

## 2.5. Data

Our data comprise Polish banks for the period 1997-2001. The balance sheet and income statement data are taken from Monitor Polski B, an official publication of the Polish government. Our original sample encompasses approximately 95% of all banking assets, which makes it the most comprehensive database on the Polish banking system. We have excluded banks whose activities sharply differ from the universal banking model pursued by most Polish banks (for example Opel Bank, Ford Bank and Volkswagen Bank), and banks for which employment data was missing. Due to application of DEA which is extremely sensitive to outliers, we have additionally deleted banks whose prices lie below or above 1 or 99 percentiles.

According to the intermediation approach, we specify three outputs (loans, government bonds, and off-balance sheet items) and three inputs (capital, labor and deposits). All variables, with the exception of labor, are measured in thousands of Polish zlotys. Labor is measured in numbers of employees. In order to ensure that loan portfolios are of comparable quality, we subtracted loan loss provisions from the loans (Grigorian and Manole (2002)). We have omitted securities holdings that are often treated as output in similar studies, because we consider their amount negligent. Instead we have included government bonds, since their portfolio comprises at times a very significant part of the total assets particularly for small domestic banks. In order to calculate allocative efficiency we have computed prices of our inputs. *Price of capital* is calculated as depreciation of fixed assets divided by fixed assets. *Price of labor* is derived by taking the total expenditures on wages, salaries, and employee benefits divided by the number of employees. *Price of deposits* is arrived at by dividing interest expenses by the total amount of deposits.

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<sup>8</sup> A good reference book on efficiency measures is Thanassoulis (2001).

Table 2.2. Summary Statistics of the Variables Employed in the DEA Model (in Thousand of Zloty)

	Domestic		Foreign	
	Mean	Standard deviation	Mean	Standard Deviation
<i>1997</i>				
<i>Number of banks</i>	38		14	
<i>Outputs</i>				
Loans	2 367 064.13	3 995 354.76	1 332 298.13	1 623 554.12
Treasury bonds	1 470 763.01	4 050 001.65	220 630.834	387 583.848
Off-balance items	939 321.05	1 908 725.49	762 978.571	1 777 811.43
<i>Inputs</i>				
Deposits	3 744 095.33	7 949 590.31	1 357 632.82	1 984 863.37
Fixed assets	131 486.76	216872.11	55 970.92	144 453.65
Labor <sup>1)</sup>	3 456.97	7769.38	731.1429	1 736.28
<i>Prices of inputs<sup>2)</sup></i>				
Price of deposits	0.1184	0.0356	0.1186	0.0458
Price of fixed assets	0.1538	0.0866	0.3428	0.1669
Price of labor	47.8252	16.5989	177.48	95.26
<i>1999</i>				
<i>Number of banks</i>	31		22	
<i>Outputs</i>				
Loans	3 307 523.70	6 223 889.96	4 083 956.67	6 817 678.48
Treasury bonds	1 599 600.71	4 716 176.43	1 589 857.62	4 365 196.87
Off-balance items	886 825.806	2 021 721.54	1 063 168.18	1 574 337.24
<i>Inputs</i>				
Deposits	4 785 951.15	10 949 736.5	5 393 540.94	10 176 535.5
Fixed assets	165 611.031	326 641.749	178 182.811	358 821.022
Labor <sup>1)</sup>	2 674.0323	7 424.7004	2 756.4091	5 439.3222
<i>Prices of inputs<sup>2)</sup></i>				
Price of deposits	0.0873	0.0234	0.0780	0.0214
Price of fixed assets	0.1861	0.1248	0.2865	0.1740
Price of labor	71.2348	33.2521	138.496	94.0790
<i>2001</i>				
<i>Number of banks</i>	10		21	
<i>Outputs</i>				
Loans	5 695 618.64	12 044 016.1	7 597 573.88	10651413.1
Treasury bonds	3 420 061.56	8 049 267.13	2 423 719.48	4743339.7
Off-balance items	962 700	2 052 436.01	2 565 000.00	3451011.52
<i>Inputs</i>				
Deposits	9 440 915.21	22 086 588.2	10 034 833.1	14 542 018.0
Fixed assets	295 521.321	671 071.669	330 825.361	486 336.744
Labor <sup>1)</sup>	5 077.800	1 1894.5454	3 248.0952	4 875.5554
<i>Prices of inputs<sup>2)</sup></i>				
Price of deposits	0.1012	0.0187	0.0976	0.0310
Price of fixed assets	0.2649	0.1408	0.2995	0.2126
Price of labor	79.3609	16.3632	157.3751	75.8608

1) Labor is measured in numbers of employees.

2) Prices of inputs are defined as labour expenses, depreciation expenses, and interest expenses divided by number of employees, fixed assets, and deposits, respectively.

Table 2.2 presents the summary statistics for the outputs, inputs, and prices of inputs separately for foreign and domestic banks. When one looks at the figures carefully a few quick conclusions can be drawn. First of all, we observe growth in the average size of foreign banks during the analyzed period. This can be attributed to the privatization process that saw

the transfer of ownership from the government to foreign investors. Second, foreign and domestic bank portfolios have different asset composition; foreign banks persistently hold more loans, whereas domestic banks prefer to invest in safe Treasury bonds. Additionally, foreign banks are more actively engaged in off-balance sheet transactions.

Contrary to the theory and evidence in other countries (Isik and Hasan (2002)) foreign banks in Poland have slightly lower price of deposits than domestic banks. This finding is not totally surprising in light of the Polish situation. First of all, most foreign banks gained significant deposit market shares by acquiring domestic banks with developed branch networks through the privatization process. Second, foreign banks are usually owned by reputable owners and foreign ownership is often treated as implicit deposit insurance. Wagner and Iakova (2001) comment that the presence of foreign banks might add to the stability of the banking system by reducing the risk of capital flight and depositor runs.

Table 2.2 presents the drastic differences between foreign and domestic banks in terms of the prices of two other inputs, namely labor and capital. The high price of labor for foreign banks cannot be solely attributed to the high wages paid to foreign executives compensating them for living in a foreign country. The more plausible explanation, which is backed by anecdotal evidence, is the wish of foreign banks to attract skilled employees by offering them higher salaries. The higher price of capital for foreign banks can be due to their higher reliance on state-of-art technology and automation of banking services than their domestic counterparts<sup>9</sup>.

Of course, we are aware of data problems that are relevant for all transition countries. Accounting standards are not strictly enforced and noncompliance to rules set by the supervisory authorities is widely spread. However, we believe that such behavior is equally practiced by all market participants and, therefore, should not influence the results. Another difficulty is the unequal treatment of state and private banks. There is anecdotal evidence that supervisory authorities are more lenient in their treatment of state banks (Grigorian and Manole (2002)). Thus, when analyzing the findings of our research, we should keep this bias in mind.

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<sup>9</sup> The positive relationship between efficiency and two variables, labour price and ownership of ATMs, was documented by Sathye (2001) for the banking market in Australia.

## 2.6. Empirical Findings

### 2.6.1 Results of the Efficiency Assessment for Foreign and Domestic Banks

To investigate the efficiency of Polish banks we compute cost, allocative, technical, pure technical, and scale efficiency using Data Envelopment Analysis. We assess the efficiency of foreign and domestic banks first relative to their separate and then pooled frontiers.

Table 2.3. The Summary of the Mean Efficiency Measures Calculated Relative to Separate and Common Frontiers for the Years 1997-2001

	Separate frontiers		Common frontier	
	Domestic	Foreign	Domestic	Foreign
1997				
CE	0.6426	0.7725	0.5822	0.7665
AE	0.8813	0.8916	0.8775	0.9090
TE	0.7331	0.8600	0.6588	0.8360
PTE	0.8119	0.9391	0.2068	0.1516
SE	0.9028	0.9187	0.1224	0.1165
1998				
CE	0.4952	0.7501	0.4032	0.6245
AE	0.6247	0.8680	0.6949	0.8238
TE	0.7901	0.8567	0.5970	0.7571
PTE	0.8626	0.9572	0.2069	0.1600
SE	0.9156	0.8968	0.1883	0.1826
1999				
CE	0.4216	0.6647	0.3883	0.5461
AE	0.5633	0.8554	0.7006	0.8147
TE	0.7527	0.7623	0.5715	0.6686
PTE	0.8191	0.8998	0.2534	0.1842
SE	0.9206	0.8472	0.1882	0.2127
2000				
CE	0.4924	0.7930	0.4877	0.6396
AE	0.6256	0.8783	0.6925	0.8114
TE	0.7855	0.8964	0.7062	0.7759
PTE	0.8898	0.9607	0.1840	0.1663
SE	0.8800	0.9320	0.1412	0.1658
2001				
CE	0.5925	0.7043	0.4862	0.6014
AE	0.7403	0.8968	0.7984	0.8287
TE	0.8015	0.7850	0.6194	0.7254
PTE	0.9034	0.9248	0.2289	0.2017
SE	0.8856	0.8446	0.2016	0.1780
All				
CE	0.5292	0.7323	0.4711	0.6372
AE	0.6957	0.8772	0.7893	0.8431
TE	0.7649	0.8274	0.6014	0.7497
PTE	0.8440	0.9345	0.7474	0.8730
SE	0.9063	0.8842	0.8284	0.8546

Note: CE – cost efficiency, AE – allocative efficiency, TE – technical efficiency, PTE – pure technical efficiency, SE – scale efficiency.

The results of the efficiency measures are presented in Table 2.3. The mean efficiency that we find in our investigation is lower than that reported in earlier studies on Poland (Grigorian and Manole (2002)). We attribute this discrepancy to the larger sample of banks analyzed in our paper, which additionally includes many small banks. We also analyze a different time period in our study. It is noteworthy that the mean technical efficiency in Poland is lower than the average 90% efficiency observed in the European Union (European Commission (1997)).

Under both assumptions, common and separate frontier, foreign banks exhibit a higher level of efficiency than domestic banks. The difference though seems to be very high and, therefore, our next step is to determine whether foreign and domestic banks come from the same population. Similar to other studies (see e.g. Isik and Hassan (2002)), we perform a number of parametric (t-test) and non-parametric (Wilcoxon Rank-Sum, Kruskal-Wallis, and Kolmogorov-Smirnov) tests to test the null hypothesis that all banks come from the same population. The results of the tests are presented in Table 2.4. Most tests when applied to cost and allocative efficiency measures reject the null hypothesis at the 1% significance level and thus it would be inappropriate to pull all banks into one sample. It is noteworthy, however, that other studies could not reject the null hypothesis (Sathye (2001); Isik and Hassan (2002)).

As it was already mentioned above, foreign banks exhibit significantly higher average cost efficiency (73.23%) than their domestic counterparts (52.92%). In general, this suggests that foreign banks have succeeded in utilizing their superior technology and expertise, which has offset potential disadvantages of not knowing the local market. The results are in line with other studies that were conducted for emerging markets (Bonin et al. (2004); Isik and Hassan (2002); Grigorian and Manole (2002); Hasan and Marton (2000); Kraft and Tirtiroglu (1998); Bhattacharyya et al. (1997)).

Now we split cost efficiency into its allocative and technical components. Figures in Table 2.3 show that there is much room for improvement in allocative efficiency, particularly for domestic banks. High allocative inefficiency could be related to fluctuations in input prices, which leads to management's inability to make long-term decisions. This explanation, however, does not seem to be the only relevant argument for our sample, since there is a large discrepancy between foreign and domestic banks. The plausible reason could be the idle capacity and staff redundancies of some old, formerly state-owned banks. Even when management recognizes the need to choose a different mix of inputs in light of given prices, it might feel constrained from doing so due to, for example, political and social resistance to lay off staff.

During the observed period of 1997-2001 the efficiency of banks, both domestic and foreign, has not only not improved, but has even deteriorated on average. From Table 2.3 it is evident that efficiency declined in 1999 by around 7% and 9% for domestic and foreign banks, respectively. The efficiency of foreign banks fell also sharply in 2001. These figures might reflect the restructuring process that imposed additional costs on banks. In 1999 30% of banking assets were transferred from domestic to foreign owners (see Table 2.1). Additionally, the consolidation activity involved 25% and 27% of banking assets in the years 1999 and 2001.

Table 2.4. Summary of Parametric and Non-Parametric Tests of the Hypothesis that Domestic and Foreign Banks Possess the Same Technology (Frontier)

Test statistics	Name of the test			
	t-test	Wilcoxon Rank-Sum test	Kruskal-Wallis test	Kolmogorov-Smirnov test
	t (Prob>t)	z (prob>z)	Chi2 (prob>Chi2)	D (prob>D)
<i>1997</i>				
CE	-2.01 (0.0503) *	1.8281 (0.0338) **	3.3806 (0.0660) *	0.310811 (0.2803)
AE	-0.27 (0.7869)	0.4650 (0.3210)	0.2261 (0.6344)	0.204633 (0.7887)
TE	-1.98 (0.0533) *	1.9510 (0.0511) *	3.8482 (0.0498) **	0.378378 (0.1091)
PTE	-2.81 (0.0074) ***	2.1234 (0.0169) **	4.5567 (0.0328) **	0.324324 (0.2357)
SE	-0.41 (0.6871)	1.1812 (0.1188)	1.4211 (0.2332)	0.389961 (0.0911) *
<i>1998</i>				
CE	-4.39 (<.0001) ***	3.8096 (<.0001) ***	14.5896 (<.0001) ***	0.588235 (0.0008) ***
AE	-6.00 (<.0001) ***	4.3894 (<.0001) ***	19.3546 (<.0001) ***	0.705882 (<.0001) ***
TE	-1.35 (0.1842)	1.3092 (0.0952) *	1.7406 (0.1871)	0.294118 (0.2807)
PTE	-2.65 (0.0107) **	2.3383 (0.0097) ***	5.5184 (0.0188) **	0.352941 (0.1188)
SE	0.59 (0.5569)	0.0812 (0.4676)	0.0083 (0.9272)	0.205882 (0.7227)
<i>1999</i>				
CE	-4.34 (<.0001) ***	4.0769 (<.0001) ***	16.6941 (<.0001) ***	0.647989 (<.0001) ***
AE	-8.11 (<.0001) ***	5.4093 (<.0001) ***	29.3570 (<.0001) ***	0.847701 (<.0001) ***
TE	-0.17 (0.8670)	0.3180 (0.3752)	0.1070 (0.7436)	0.227011 (0.5078)
PTE	-1.71 (0.0938) *	0.8593 (0.1951)	0.7547 (0.3850)	0.295977 (0.2002)
SE	1.87 (0.0687) *	-1.2538 (0.1050)	1.5948 (0.2066)	0.313218 (0.1520)
<i>2000</i>				
CE	-5.02 (<.0001) ***	-3.7952 (<.0001) ***	14.5174 (<.0001) ***	0.649275 (0.0009) ***
AE	-5.62 (<.0001) ***	-4.2584 (<.0001) ***	18.2617 (<.0001) ***	0.802899 (<.0001) ***
TE	-2.15 (0.0381) **	-1.8996 (0.0287) **	3.6668 (0.0555) *	0.385507 (0.1346)
PTE	-1.64 (0.1167)	-1.2773 (0.1007)	1.6760 (0.1955)	0.226087 (0.7422)
SE	-1.37 (0.1787)	-1.6452 (0.0500) **	2.7579 (0.0968) *	0.339130 (0.2473)
<i>2001</i>				
CE	-1.43 (0.1627)	-1.3358 (0.0908) *	1.8372 (0.1753)	0.365217 (0.3104)
AE	-3.40 (0.0019) ***	-2.7308 (0.0032) ***	7.5647 (0.0060) ***	0.639130 (0.0067) ***
TE	0.22 (0.8278)	0.1781 (0.4293)	0.0391 (0.8432)	0.265217 (0.7109)
PTE	-0.40 (0.6946)	-0.3332 (0.3695)	0.1263 (0.7223)	0.269565 (0.6918)
SE	0.73 (0.4727)	0.4551 (0.3245)	0.2255 (0.6349)	0.278261 (0.6531)

Note: The t- test is a parametric test that tests the null hypothesis, that foreign and domestic banks have the same mean; Wilcoxon Rank-Sum , Kruskal-Wallis are non-parametric tests that test the shift in the location of the distribution, Kolmogorov-Smirnov Test is a non-parametric test that tests the hypothesis of the equality of the distributions.

\*\*\* - 1% significance level, \*\* - 5% significance level, \* - 10% significance level.

Another explanation for the failure of Polish banks to improve efficiency could be the rapid growth of certain types of loans and an exacerbated non-performing loan problem. During the analyzed period the structure of assets underwent a drastic change. Previous easy sources of income, such as Treasury bonds and loans to blue-chip companies, were exhausted. The banks had to tap new and riskier segments of the market, such as households and small and medium enterprises. The assets grew very rapidly in Poland<sup>10</sup>, with loans to individuals growing by 54.2% and mortgages by 93.6% in the year 1999 alone (National Bank of Poland (2002)). As assets grow too fast, management could have difficulties controlling costs and risks (International Monetary Fund (2001)), and indeed non-performing loans increased from 10.2% of the loan portfolio in 1997 to 17.9% in 2001 (National Bank of Poland (2002)). To preview our regression results, we find evidence that even though growth itself did not affect efficiency, the problem loans reduced cost-efficiency significantly.

We can further disentangle technical efficiency into pure technical efficiency and scale efficiency. After eliminating the scale factor we observe much higher technical efficiency. Foreign banks exhibit 93.45% pure technical efficiency, which is within the range observed in the EU (European Commission (1997)), whereas domestic banks show a smaller figure of 84.4, which is still comparable with other developed countries. These findings, however, should be treated with caution. The fact remains that Polish banking data is very thin for large size banks. When calculating pure technical efficiency, we could label large banks efficient only because there would be no benchmark of similar size for comparison. Thus, in our future discussion we rely only on the results drawn from the cost, allocative and technical efficiency measures.

### **2.6.2 The Results of the Investigation of the Determinants of Cost Efficiency**

In order to investigate the determinants of cost efficiency we construct an econometric model with the cost, technical and allocative efficiency as dependent variables. Due to the limited nature of our efficiency measure, which ranges from zero to one, we estimate our models using Tobit. The findings are summarized in Table 2.5.

We examine the effect of three groups of factors on efficiency. First of all, we want to analyze the influence of different institutional aspects. To capture the impact of foreign ownership we include *greenfield* and *takeover* dummies, which help us to determine the impact of a particular strategy pursued by foreign investors. We also want to test whether

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<sup>10</sup> Banking assets have grown by 57.6% in real terms between 1997-2001.



foreign banks tend to acquire better performing institutions, and thus we include the dummy *target* that takes the value of one for the years prior to acquisition by foreign investors. Because of the high correlation between the *takeover* and *target* variables, we cannot use them in the regression simultaneously, and therefore we run two models, A and B, which contain either *takeover* or *target* dummies. To capture the effect of state ownership we define the dummy *state* for the banks that have remained directly or indirectly under the control of the Treasury. Banks that are publicly listed on the Warsaw Stock Exchange are also distinguished by the dummy *publicly listed*.

Second, as suggested by Berger et al. (2000), we differentiate between home countries of foreign banks. We assign dummies for Germany, the USA, the Netherlands, and France, because these countries have the highest number of banks represented in Poland<sup>11</sup>. Germany, the USA, and the Netherlands also controlled the highest shares of capital among foreign banks, 24.20%, 19.26%, and 11.45% in 2001, respectively. Among the third group of independent variables there are various bank characteristics, such as *logarithm of total assets*, *capitalization*, *variance of ROE*, *loan loss provisions/loans*, and *asset growth*.

The results of Model A in Table 2.5 show that greenfield banks are more efficient than both domestic and takeover banks. Even if we run a univariate regression, we find no positive association between cost efficiency and takeover banks. The findings of Model B indicate that target banks acquired by foreign investors experienced slightly higher allocative efficiency prior to acquisition, albeit the coefficients of technical and cost efficiency are not significant. Thus, we can conclude that foreign ownership has not helped to transform domestic banks into more efficient institutions. The higher efficiency of greenfield institutions could be attributed to their better risk management techniques, and reliance on modern information technologies. However, since takeover banks do not demonstrate similar positive findings, some additional explanations are needed. Whereas takeover banks inherit their customer mix from former domestic banks, greenfield institutions often enter foreign markets following their clients, large multinational corporations, and later are often accused of picking the best borrowers. Thus, their higher efficiency could simply reflect a different asset structure. Transfer pricing from their parent institutions seems to be an unlikely reason for the higher efficiency, because many senior bankers claim that a significant share of revenues of banks headquartered in Western Europe are generated in Central and Eastern Europe.

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<sup>11</sup> Claessens et al. (2001) documented that it is the number of foreign entries rather than their market share that have effect on domestic banks.

Table 2.5. Tobit Regression of the Efficiency Measures and Bank Characteristics

Dependent variable	Model A			Model B		
	CE	TE	AE	CE	TE	AE
<i>Organizational form/governance</i>						
	0.38***	0.43***	0.13***	0.40***	0.44***	0.14***
Greenfield	(7.97)	(7.01)	(3.32)	(8.57)	(7.35)	(3.88)
Takeover	-0.04 (-1.04)	-0.02 (-0.45)	-0.04 (-1.42)	0.03 (0.93)	-0.01 (-0.19)	0.04* (1.93)
Target	0.07** (2.05)	0.09** (2.22)	-0.02 (-0.63)	0.09** (2.52)	0.10** (2.3)	0.00 (0.14)
State	0.04 (1.23)	0.02 (0.69)	0.03 (1.24)	0.02 (0.8)	0.02 (0.66)	0.01 (0.49)
Public listing						
<i>Country dummies</i>						
	0.06 (1.26)	0.01 (0.09)	0.06* (1.74)	0.06 (1.21)	0.00 (-0.04)	0.07* (1.8)
Germany	-0.20** (-2.54)	-0.16* (-1.66)	-0.14** (-2.22)	-0.19** (-2.34)	-0.16* (-1.68)	-0.11* (-1.85)
USA	0.16*** (3.07)	0.14** (2.2)	0.09** (2.25)	-0.03 (-0.44)	-0.04 (-0.44)	-0.02 (-0.27)
The Netherlands	-0.03 (-0.45)	-0.04 (-0.43)	-0.02 (-0.31)	0.15*** (3.03)	0.13** (2.07)	0.09** (2.31)
France						
<i>Bank characteristics</i>						
	0.00 (0.01)	-0.01 (-0.11)	0.04 (1.37)	0.00 (-0.12)	-0.01 (-0.16)	0.04 (1.19)
Growth of assets	-0.46* (-1.75)	-0.10 (-0.3)	-0.41** (-1.97)	-0.51** (-1.99)	-0.13 (-0.43)	-0.45** (-2.25)
Loan loss provisions/Loans	0.26 (1.46)	0.34 (1.46)	0.02 (0.15)	0.25 (1.39)	0.32 (1.41)	0.01 (0.08)
Capitalization	-0.13** (-2.01)	-0.30*** (-3.82)	0.11** (2.21)	-0.15** (-2.32)	-0.30*** (-3.8)	0.08 (1.62)
Loan/Total assets	1.30*** (3.48)	1.10** (2.44)	0.69** (2.34)	1.30*** (3.48)	1.09** (2.42)	0.69** (2.37)
Variance of ROA	0.01 (1.38)	0.00 (0.34)	0.01 (1.3)	0.01 (1.17)	0.00 (0.28)	0.01 (1)
Log of total assets						
Constant	0.22* (1.67)	0.51*** (3.19)	0.60*** (5.83)	0.25* (1.91)	0.52*** (3.35)	0.63*** (6.22)
Number of obs.	284	284	284	284	284	284
LT Chi Sq.	190.37***	149.75***	111.92***	190.16***	149.58***	113.63***

Explanatory variables are calculated as follows: *Greenfield*: a dummy that takes value of 1 in case of a greenfield institution and 0 otherwise; *Takeover*: a dummy that takes value of 1 if a foreign bank has acquired a domestic institution and 0 otherwise; *Public*: a dummy that takes a value 1 if bank's shares are publicly traded on the Warsaw Stock Exchange and 0 otherwise; *State*: a dummy that takes a value 1 if a bank is directly or indirectly controlled by the Treasury and 0 otherwise; *Germany*, *USA*, *the Netherlands*, and *France*: a dummy that takes value of one if a foreign bank is headquartered in Germany, USA, the Netherlands, and France, respectively, and 0 otherwise; *Growth of assets*: total assets for the current year divided by total loans of the previous year; *Provisions/Loans*: loan loss provisions divided by total loans, excluding loans to other financial institutions; *Capitalization*: amount of share and supplementary capital divided by total assets; *Loans/Total assets*: total amount of loans excluding loans to other financial institutions divided by the total assets; *Variance of ROA*: variance of the return on assets; *Log of total assets*: logarithm of the total bank assets.

Looking at the home countries of foreign banks, we observe that Dutch banks have achieved higher efficiency than banks from other countries; they are followed by German banks that show higher allocative efficiency. Surprisingly, efficiency is inversely related to the American ownership dummy. Berger et al. (2000) argued that “under the limited form of global advantage hypothesis, only the efficient institutions in one or a limited number of nations with specific favorable market or regulatory conditions in their home countries can operate more efficiently than domestic banks in other nations”. Our findings that Dutch banks are more efficient than banks from other countries lend support to the above hypothesis.

State banks appear to be more efficient than other domestic banks. As it was mentioned in section 2.5, we should treat this result with caution, since the quality of state banks reporting can be doubtful. We observe no impact of public listing on efficiency. The market discipline hypothesis implies that banks whose shares are publicly traded should exhibit higher efficiency, but our findings indicate that the Polish capital market exerts no discipline over bank management. This could also be due to the fact that stock markets respond more strongly to profit measures rather than to cost efficiencies (Chu and Lim (1998))<sup>12</sup>.

Now we turn to the analysis of bank characteristics and their influence on efficiency. From the results summarized in Table 2.5, we conclude that higher efficiency is negatively associated with the quality of the loan portfolio and the share of loans to bank’s total assets, and positively with the volatility of returns. Capitalization, asset growth, and bank size do not significantly affect efficiency.

Contrary to our expectations, fast asset growth has not hindered the ability of management to control costs. However, the significant negative coefficient of the *loan loss provisions/loans* variable in the AE regression suggests that problem loans created additional costs associated with monitoring and enforcement of loan repayment. The lack of significance of *capitalization* variable is probably due to the high average capitalization of the banking system, which further increased from 12.5% in 1997 to 15.1% in 2001 (National Bank of Poland (2002)).

We find that more efficient banks have lower loans to total assets ratios. Altunbas et al. (2000) consider this ratio as a proxy for liquidity risk, and thus the negative relationship

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<sup>12</sup> To verify this conjecture we run the same regression but with return on assets (ROA) as our dependent variable. In line with our predictions publicly traded banks enjoy significantly higher profits. The results are available from the author upon request.

could indicate that less efficient banks are also less liquid. However, this does not seem to be a good explanation for the Polish banking system, which is characterized by very high liquidity. The interesting point is that when we omit off-balance sheet items from our outputs, we find that the ratio *loans to total assets* has a positive effect on efficiency<sup>13</sup>. Thus, we conclude that more efficient banks are more actively engaged in off-balance sheet activities.

At first sight, the most puzzling result is a positive association between efficiency and volatility of returns. Whereas our results contradict the earlier findings for the US (Berger and Mester (1997)), they are in line with a study done for the Turkish banking market (Isik and Hasan (2002)). Isik and Hasan (2002) argue that inefficient managers might be “passive in assuming higher risks and higher profits”. Having this in mind, we have run a few regressions with ROA as a dependent variable and volatility of returns as an explanatory one. Notwithstanding whether we use additional control variables or not, our findings suggest that riskier banks are not only more efficient, but also more profitable on average<sup>14</sup>.

## 2.7. Conclusions

In the present paper we have investigated the efficiency of Polish banks during the period 1997-2001. The preferred DEA methodology has allowed us to distinguish between five different types of efficiency, such as cost, allocative, technical, pure technical, and scale. Additionally, we have performed a number of parametric and non-parametric tests to test whether foreign and domestic banks came from the same population. Finally, we have employed multivariate regression analysis in order to detect the determinants of banking efficiency in Poland.

We have found that the average efficiency has been 52.92% and 73.23% for domestic and foreign banks, respectively. Foreign banks have exhibited higher productivity of their inputs (technical efficiency) and have been superior in choosing the right mix of inputs in light of given prices (allocative efficiency). Furthermore, the tests have rejected the null hypothesis of common frontier for foreign and domestic banks. The efficiency of the banking system has not improved over the analyzed period. The years when most of the decline took place, 1999 and 2001, were marked by accelerating privatization and consolidation processes

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<sup>13</sup> We have chosen the specification with off-balance sheet items as an output, because for many foreign banks these activities constitute a significant share of their operations. It should be mentioned that the change of the sign for the loans/total assets ratio is the only difference between the two specifications. In all other respects the results are comparable in direction and strength.

<sup>14</sup> The results are not presented in the paper, but are available from the author upon request.

that imposed additional costs on banks. Additionally, the declining loan portfolio quality has added costs associated with monitoring and enforcement of loan contracts.

Our findings that foreign banks exhibit higher efficiency than their domestic peers are consistent with other studies for transition and developing economies. However, the results of the multivariate regression analysis indicate that the higher efficiency of foreign banks has been due to the successful performance of greenfield banks. This could indicate that they have been better in managing their costs and screening borrowers. Alternatively, the findings might reflect a different mix of customers, with greenfield banks servicing multinational corporations and Polish blue-chip companies. Foreign banks that have acquired domestic banks do not appear to have enhanced their efficiency, which is an alarming sign, particularly in light of their acquisition of domestic banks with higher allocative efficiency. Our finding that Dutch banks have achieved higher efficiency than banks from other countries gives support to the hypothesis of the limited global advantage.

## **Chapter 3. Foreign Acquisitions and Industry Wealth Effects of Privatisation: Evidence from the Polish Banking Industry**

### **3.1. Introduction**

Similar to other transition countries in Central and Eastern Europe, Poland opened its banking market for foreign participants in 1998. The removal of entry barriers has caused a 53% increase in assets controlled by foreign banks in just two years, with about 70% of total banking assets under foreign ownership in 2000. At the end of 2002 14 out of 15 banks listed on the Warsaw Stock Exchange had foreign majority shareholders. This rapid transfer of ownership rights lets us focus on the benefits of allowing foreign banks' entry into transition countries.

Despite the profound changes in the Eastern European banking sector, there has been little empirical research in this field so far. Only three capital markets oriented studies shed any light on (Western) European banking mergers and acquisitions (Beitel et al. (2004), Cybo-Ottone and Murgia (2000), and Tourani-Rad and van Beek (1999)), together with some efficiency- and performance-oriented analyses (e.g., Vander Venet (1996), Molyneux et al. (1996), and Altunbas et al. (1996)). However, the empirical evidence presented in these studies faces two important differences to our sample. First, we focus on a transition country where the banking industry is by far not as developed as in Western Europe, the home countries of the acquiring banks. Second, the transactions are privatisation deals. Contrary to all other studies cited above the main seller of bank stocks in Poland is the Polish state who could interfere in the privatisation process itself and even exert influence on the governance of already privatised banks, decreasing the benefits of foreign ownership.

Privatising banks via trade sales to foreign investors might not only effect the value of the acquired bank targets but also influence the shareholder wealth of rival bank owners in the same market. Especially, the announcement effects on rival returns are not clear. On the one hand negative returns might occur because rivals can loose market shares to more efficient foreign banks. On the other hand there is a probability of efficiency spill-over effects with possible improvements of the cost-income-ratios for domestic banks and also an anticipation of future takeover premia.

To uncover the effects of privatisation to foreign investors, we study a new data set of 51 acquisitions of foreign banks between 1996 and 2002 relying on robust event study methodology that includes very recent data. First, we analyse the shareholder wealth effects of the Polish bank targets around the announcement date of acquisitions. Next, we look for shareholder wealth effects for the non-participating rival banks in the Polish bank market and

present wealth effects for the remaining domestic banks (Bessler and Murtagh (2002)). Poland is the most interesting country to look for capital market reactions because the Warsaw Stock Exchange hosts the largest number of listed banks in Central and Eastern Europe.<sup>15</sup>

The remainder of the paper is structured as follows. Section 3.2 describes potential costs and benefits for the banks acquired by foreign investors and for the non-participating banks. In section 3.3 we describe the trends in foreign bank ownership on the Polish banking market. These sections should serve as a background for the discussion that follows. Section 3.4 presents the data and the methodology, and section 3.5 provides empirical results of the investigation. Finally, section 3.6 draws some conclusions.

### **3.2. Potential Wealth Effects from Foreign Bank Ownership**

Recently, some studies analyse the value generated to target companies' shareholders by the announcement of acquisitions involving foreign European firms. For example, Danbolt (2004) and Goergen and Renneboog (2004) present evidence for positive share price reactions of acquisition targets being higher for cross-border transactions than for domestic ones, however the differences are either not significant or disappear when other factors are controlled for. Additionally, a few studies that measure the stock price reaction of target banks to foreign acquisitions in Europe (Beitel et al. (2004), Cybo-Ottone and Murgia (2000), Tourani-Rad and Van Beek (1999)) report evidence in favour of wealth effects that are higher for targets in cross-border deals.

The above studies rely on the traditional merger framework. The seller is assumed to be a diffuse shareholder group and unable to influence the behaviour after acquisition. However, the results might be different when the seller is the government as it is the case in Poland. Governments can influence the company after privatisation through economic policy, retaining some ownership, or by setting privatisation conditions, such as limiting post-privatisation lay-offs (Uhlenbruck and de Castro (2000)). Campa and Hernando (2004) show that acquisitions in industries that had previously been under government control or that are still heavily regulated generate lower value than M&A announcements in unregulated industries. Additionally, their findings indicate that this difference is significant when the acquirer is a foreign firm and when the merger takes place in a financial industry.

The literature discussed above focuses on developed countries in Europe, but we are not aware of any event study that analyse the capital market reaction to foreign acquisitions in

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<sup>15</sup> As of April 2004 there were 14 bank stocks listed on the Warsaw Stock Exchange. For comparison, 3 and 10 bank stocks were listed on the stock exchanges in Prague and Budapest, respectively.

Central and Eastern Europe. However, we can rely on the findings of X-efficiency studies that identify a number of advantages of foreign ownership for banking institutions in transition countries where it replaces state ownership.<sup>16</sup> In this case foreign owners enhance banks' efficiency by reducing the importance of directed credit and introducing better risk management practices, bringing access to cheaper resources and streamlining banking operations. A number of authors measure relative efficiency of foreign and domestic banks in transition countries and find that foreign banks enjoy higher efficiency than their domestic peers (Isik and Hassan (2002), Grigorian and Manole (2002), Hasan and Marton (2003), Bhattacharyya et al. (1997)). Claessens et al. (2001) find that foreign banks in transition countries tend to have lower overhead costs and loan loss provisions and higher profits than domestic banks.

The impact of foreign banks entry on the remaining domestic banks is even less clear. It is usually assumed that foreign banks spur competition and thus render domestic banking markets more efficient. Claessens et al. (2001) demonstrate that for most countries higher foreign ownership is associated with a reduction of costs and net interest margins for domestically owned banks. Domestic banks also benefit from spill-over effects by coping from foreign banks new financial practices and modern techniques. There is also evidence that foreign banks positively improve regulation and supervision of banking markets in their host countries.

However, the benefits from higher foreign bank ownership for the remaining domestic banks might not materialize immediately. In fact, Claessens et al. (2001) find that profitability of domestic bank falls after the entry of foreign banks. This highlights the risks for domestic banks, which can suffer from the lower charter value and be forced to pursue riskier activities in order to compete with their foreign counterparts. Lensink and Hermes (2004) show that after the entry of foreign banks, domestic banks in developing countries with inefficient banking systems experience initially higher costs because they have to invest in modern technology, training personnel, etc.

Additionally, we can also expect positive abnormal returns for the non-participating banks that would be consistent with the market power hypothesis, which states that the consolidation of the banking market gives the remaining banks more market power in setting prices on retail financial services (Berger et al. (2000)). This is very relevant for the Polish banking market, because foreign bank ownership spurred its consolidation. The number of

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<sup>16</sup> Interestingly, the efficiency literature on developed countries gives the opposite results. Foreign banks that enter already developed banking markets perform worse than their domestic counterparts due to additional costs of overcoming informational asymmetries.



banks in Poland decreased from 83 institutions in 1997 to 59 in 2002, which happened mainly due to 28 mergers that took place during this period. Consolidation was often directly caused by foreign ownership because foreign owners decided to merge two institutions that were under their control. Additionally, many domestic banks chose to merge in response to the growing competition pressure from foreign banks.

Alternatively, the positive reaction of non-participating banks could be driven by the stock behaviour of the remaining domestic banks. When Polish authorities agreed to liberalize foreign banks' entry, there was a great interest from foreign investors in acquiring domestic banks. Thus, the announcements of foreign acquisitions were good news also for non-participating domestic bank shareholders, because they could anticipate the interest of foreign investors in their institutions as well.

### **3.3. The Polish Banking System**

Foreign banks were allowed to purchase controlling stakes in Polish banks relatively late in comparison to other Central and Eastern European countries. When privatisation started in 1993, foreign banks were entitled only to minority shares whereas controlling stakes remained with the treasury. In 1998 a new Act on Banking came into force, which removed all restrictions for foreign banks. The concept of privatisation changed as well and the government started to seek reputable foreign banks in order to collect large privatisation revenues. The high minimum capital requirement of 5 million ECUs accelerated the involvement of foreign banks, since domestic banks could not raise such large amounts of money on the local market.

In section 3.2 we argued that state involvement in governance of privatised banks could diminish wealth effects for shareholders of target banks. Bonin and Wachtel (1999) describe the privatisation process in Poland and conclude that multiple policy objectives delayed the transfer of control to independent investors. In certain cases, even when the government retained only a minority share of a bank, it was able to exert pressure. To illustrate this, we can consider the privatisation of Bank Handlowy, where the sale contract included a number of restrictions, such as a limit on the disposal of shares by core investors. Moreover, in 1999 the government decided to use its 25% non-voting share to recapitalise the Polish state insurance company, but did not inform the bank management before the transaction was reported in the press.

Despite the above difficulties, the importance of foreign banks in the Polish banking market increased as can be seen from the measures in Table 3.1. The year 1998 was the

turning point in terms of foreign ownership of Polish banks. Even though the share of assets and capital controlled by foreign investors has not changed significantly during this year, the value of foreign acquisitions grew ten times in comparison with the previous year. Just two years later, in 2000, 15 out of 16 banks listed on the Warsaw Stock Exchange had already foreign majority ownership and the share of assets controlled by foreigners grew from about 17% in 1998 to about 70% in 2000.

Table 3.1: Summary Statistics of the Polish Banking Structure

	1996	1997	1998	1999	2000	2001	2002
Number of commercial banks	81	83	83	77	74	71	59
of which foreign-owned banks	25	29	31	39	47	48	45
Number of listed banks	11	14	16	16	16	16	15
of which foreign	5	5	5	9	15	15	14
Assets controlled by foreign banks (in %)	13.7	15.3	16.6	47.2	69.5	69.2	67.4
Capital controlled by foreign banks (in %)	20.9	24	24.7	50.2	77.6	80.2	77.8
Share of listed banks in the total banking market in terms of							
Loans	22.9	39.5	54.2	58.8	58.5	67.2	68.4
Total assets	20.0	35.3	52.1	55.1	58.1	65.6	65.8
Deposits	19.0	31.9	48.4	52.7	56.3	65.3	64.5
Value of analysed acquisition deals in mil. US \$	68.7	123.4	1229.4	1588.1	1173.2	786.9	148.7

Note: The number of commercial banks does not include banks declared bankrupt or under liquidation. Cooperative banks are also excluded. The numbers were sourced from National Bank of Poland (1998, 1999, 2000, 2001, 2002).

Foreign banks pursued two strategies in acquiring Polish banks during the privatisation process. A number of banks (Citibank, Bank Austria Creditanstalt, Bayerische Hypovereinsbank) first established greenfield operations in form of subsidiaries, then acquired Polish institutions and finally merged subsidiaries with the domestic banks they controlled. Other institutes (Commerzbank, KBC, Allied Irish Bank) acquired Polish banks without prior presence on the Polish banking market.

Since our methodology allows us to analyse the impact of foreign ownership only on listed banks, it is necessary to consider the role that they play in the Polish banking industry. As can be seen from Table 3.1, the number of listed institutions and their share in total banking assets, loans and deposits increased almost continuously since 1996 and in 2002 14 listed banks accounted for about 66% of total assets. It is noteworthy that listed institutions differ significantly from unlisted banks in terms of shares controlled by foreign and small investors, as well as by the Treasury. For example, in 2002 foreign investors owned about 75.1% of listed banks stocks, whereas only about 63.2% of unlisted bank stocks were owned

by foreigners. Small investors and the Treasury controlled 19.5% and 1.9% of listed bank stocks, as well as 10% and 17.3% of the stocks of unlisted institutions.

### **3.4. Data and Methodology**

To identify foreign bank acquisitions in Poland between 1996 and 2002 we use Thomson Financial SDC (Securities Data Company – Mergers and Acquisitions Database). Bloomberg only provides data for deals back to 1997. To verify data we use additional press research in the Financial Times. Data on returns on individual equities, market capitalization and the WIG index are directly provided by the Warsaw Stock Exchange. Transactions are selected according to the following criteria: First, the transaction was announced between January 1, 1996 and December 31, 2002. Second, the bidder was a non-Polish bank.<sup>17</sup> Third, the target was an exchange listed Polish bank. Fourth, the transaction has been closed (the deal status is "completed"). Both, the target firms and the rivals were listed on the Warsaw Stock Exchange for at least 170 trading days prior to the announcement and 20 days (i.e. one month) after the announcement of a transaction. The data are summarized in Table 3.2.

Table 3.2 shows the 51 transactions. The total volume exceeds 5 US-\$ billions. The average transaction value is worth about 160 US-\$ millions, ranging from 2.3 US-\$ millions to 1.4 US-\$ billions.<sup>18</sup> The average share that was acquired by foreign investors is about 55% and the median about 31%. Therefore, we are able to analyse whether the size of a transaction has any additional wealth effect. We can assume that the target stock price reaction would be more significant when a larger share is acquired and thus a foreign bank assumes control over the target.

In order to estimate the wealth effect of foreign acquisitions for shareholders of Polish banks we perform an event study. Due to the fact that some stocks were infrequently traded on the Warsaw Stock Exchange, the traditional market model would produce beta coefficients, which would be biased downwards. Therefore, following Dimson (1979) we rely on the aggregated coefficient method and regress observed bank stock returns on preceding, synchronous and subsequent market returns:

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<sup>17</sup> All transactions are included when a Polish bank was acquired by foreign investors, regardless of transaction volume. We can not compare the results of foreign acquisitions with domestic ones, because only one listed bank was acquired by a domestic investor: Bank Rozwoju Eksportu SA takeover Polski Bank Rozwoju SA in 1998.

<sup>18</sup> Beitel et al. (2004) and Cybo-Ottone and Murgia (2000) analyse M&As of banks in Europe and observe an average transaction value of 3.3 and 1.61 US-\$ billions, respectively. However, they only include transactions that exceed 100 US-\$ millions and when a change in control of the target took place. If we exclude from our sample deals that lie below the threshold of 100 US-\$ millions, the average transaction value rises from about 160 to 390 US-\$ millions.

$$R_{it} = \alpha_i + \sum_{k=-3}^1 \beta_{ik} M_{t+k} + w_{it}, \quad (3.1)$$

where  $R_{it}$  is the return for the bank stock  $i$  at date  $t$ , and  $M_{t+k}$  is the market return on the benchmark for the day  $t+k$ . The model parameters  $\alpha_i$  and  $\beta_{ik}$  are estimated for each stock separately with ordinary least squares. As market benchmark we employ the WIG index. We have chosen 150 days prior to the event window as our estimation period.<sup>19</sup>

Table 3.2: Summary of Cross-Border M&A Transactions

Target Name	Acquirer Name	Value (Mil. US- \$)	Number of deals
Bank Handlowy SA	Commerzbank AG	n.a.	2
Bank Handlowy SA	Citibank NA	1023.34	5
Bank Przemyslowo-Handlowy SA	AIB Group	65.95	1
Bank Przemyslowo Handlowy SA	Bayerische Hypovereinsbank	1420.22	6
Bank Rozwoju Eksportu Bank SA	Commerzbank AG	n.a.	3
Wielkopolski Bank Kredytowy SA	Allied Irish Bank	179.22	3
Bank Polska Kasa Opieki SA	Investor Group	1047.58	3
Bank Inicjatyw Gospodarczych SA	Merrill Lynch International	n.a.	1
Bank Komunalny SA	Nordbanken AB	8.93	1
Bank Ochrony Srodowiska SA	Skandinaviska Enskilda Banken	73.18	3
Bank Amerykanski w Polsce SA	Banque Bruxelles Lambert SA	n.a.	1
Bank Amerykanski w Polsce SA	Bayerische Landesbank	2.32	1
Bank Amerykanski w Polsce SA	DG Bank	67.12	1
Bank Amerykanski w Polsce SA	DZ Bank AG	11.54	1
Bank Wspolpracy Regionalnej SA	Deutsche Bank AG	59.58	2
Pierwszy Polko-Amerykanski Bank SA	Generale de Banque SA	3.5	1
Pierwszy Polko-Amerykanski Bank SA	Fortis AG	89.11	2
Kredyt Bank SA	EBRD	5.35	1
Kredyt Bank SA	Kredietbank NV	3.94	2
Kredyt Bank PBI SA	KBC Bancassurance Holding NV	575.09	5
Kredyt Bank PBI SA	Banco Espirito Santo	n.a.	1
Powszechny Bank Kredytowy SA	Bank Austria AG	111.25	3
Powszechny Bank Kredytowy SA	Bayerische Hypovereinsbank	340.25	2
Total		5087.47	51
Average		159.94	
Median		67.77	
Maximum		1047.58	
Min		0.23	

Source: Thomson Financial Mergers and Acquisitions Database.

As can be seen from formula (3.1), the traditional market model is augmented by lagged and leading terms of the market return. At first, we included five lagged and five leading market terms, however, only the three lagged and one leading term turned out to be

<sup>19</sup> We tried a number of longer estimation windows as well. The results do not change substantially. However, the fit of the model is better when shorter estimation windows are used.

statistically significant and produced the highest  $\bar{R}^2$ . Hence, we have decided on this specification. It is noteworthy that when we add non-synchronous market terms, the  $\bar{R}^2$  rises from 22% to 31% showing that Dimson's method has higher explanatory power than the conventional market model.

Abnormal returns are computed using the following formula:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \sum_{k=-3}^1 \hat{\beta}_{ik} M_{t+k}, \quad (3.2)$$

We calculate cumulative abnormal returns (CARs) for each stock over the following event windows: [-20, 0], [-10, 0], [-5, 0], [-2, 0], [-1, 0], [0, 0], [-1, 1], [-2, 2], [-5, 5], [-10, 10], [-20, 20]. Further, we average the CARs for all stocks and test whether  $\overline{CAR}$  is different from zero using the  $J_1$  test statistic suggested by Campbell et al. (1997). We estimate the long-term impact of announcements by relying on CARs for the [-100, 100] event window.

In addition to the analysis of the impact of foreign acquisition announcements on target banks, we apply the same methodology to investigate the effect of increased foreign participation on the banking industry as a whole. For this purpose, we study CARs around announcement dates for the two bank indexes. An index consisting of all institutions (domestic and foreign) that do not participate in cross-border M&As at this moment, and an index consisting of the remaining domestic banks. Of course, the number of domestic banks included in the index declined during the analysed period since almost all listed banks were acquired by foreign owners.<sup>20</sup>

After estimating the cumulative abnormal returns, we take our analysis a step further and investigate which factors have an effect on them. First, we expect that abnormal returns will be higher when foreign investors gain control over a bank, allowing them to embark on the necessary reorganization. Second, large institutions may be more difficult to restructure and thus their size, measured by the market capitalization, would have a negative impact on abnormal returns. To test these two hypotheses, we estimate the following regression:

$$CAR_i = \alpha_i + \beta_1 Share_i + \beta_2 Capitalization_i + \beta_3 D_i + \varepsilon_i, \quad (3.3)$$

where  $CAR_i$  is the cumulative abnormal returns of a bank  $i$ ,  $Share_i$  the share of a transaction's value in the capitalization of a bank  $i$ , and  $Capitalization_i$  the logarithm of the

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<sup>20</sup> The only Polish listed bank that is still domestically owned is Bank Ochrony Srodowiska SA. The bank is controlled by the National Fund for Environmental Protection and regional environmental funds, but even it has a foreign investor, Sweden's Skandinaviska Enskilda Banken AB, which bought 32.1% of bank's shares in 2000.

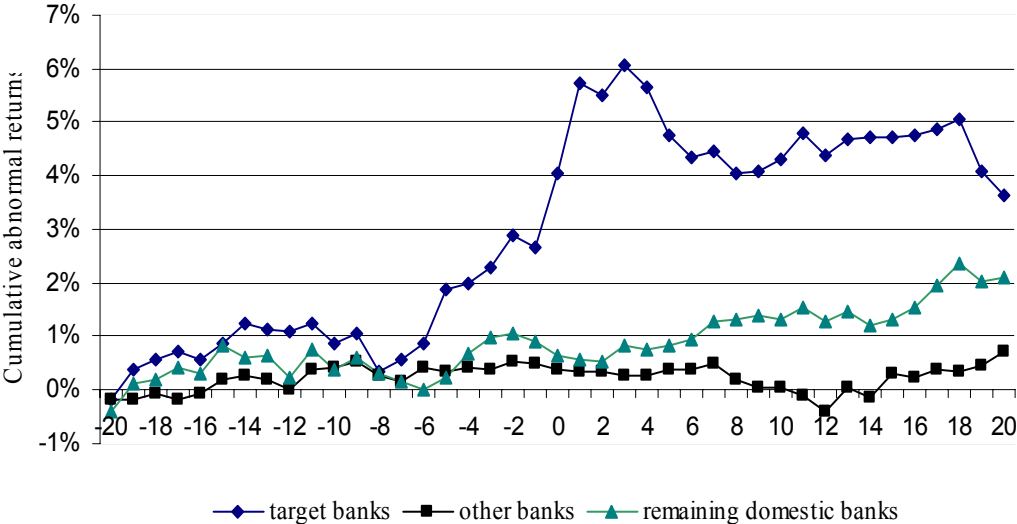
capitalization of a bank stock  $i$  on the Warsaw Stock Exchange on the last day of the month prior to foreign acquisition.  $D_t$ ,  $t = 1996, \dots, 2002$  are year dummies.

**3.5. Empirical Findings**

**3.5.1 Stock Market’s Reaction to Announcements**

Figure 3.1 reports CARs for 41 days surrounding the announcement of foreign acquisition and Table 3.3 the corresponding estimation results. The findings are reported separately for three groups of banks, namely (1) for target banks, (2) all other banks that have not participated in acquisitions, and (3) the remaining domestic banks. As can be seen from Figure 3.1 and Table 3.3 the shareholders of target banks experienced positive abnormal returns of 3.64% over the 41 day event window. The results are consistent with other studies that analyse cross-border M&As and find a positive reaction of targets to foreign acquisitions.

Figure 3.1: Cumulative Abnormal Returns for Target and Other Banks (41 Days Event Window)



However, the magnitude of our results is smaller than those reported by other studies. For example, Beitel et al. (2004) show that the average CARs over the 3 day event period [-1, 1] equals 7.22% (compared to our 2.84%) for international target banks acquired by West European banks. This difference may result from different corporate governance structures in our data set, namely from the fact that we have the state as one remaining (minority) shareholder after the transaction and that we included all deals in our analysis regardless of their size and the acquired share. We can assume that deals that involve the transfer of control

to foreign owners should be greeted by higher abnormal returns. We will investigate this issue further in the second subsection.

Table 3.3: Estimation Results on Cumulative Abnormal Returns (41 Days Event Window)

	CAR in %	$J_1$	S.D. in %	Positive	Negative
A. Target banks					
[-20, 0]	4.05***	13.71	12.15	32	19
[-10, 0]	2.81***	17.83	8.94	30	21
[-5, 0]	3.17***	35.95	7.79	31	20
[-2, 0]	1.76***	41.51	5.86	31	20
[-1, 0]	1.15***	20.68	5.25	29	22
[0, 0]	1.40***	29.93	4.61	28	23
[-1, 1]	2.84***	46.72	7.69	31	20
[-2, 2]	3.23***	33.74	10.22	30	21
[-5, 5]	3.86***	21.91	11.62	31	20
[-10, 10]	3.05***	6.57	14.90	31	20
[-20, 20]	3.64***	5.05	18.21	32	19
B. All other banks					
[-20, 0]	0.47***	7.03	0.59	27	24
[-10, 0]	0.04***	-8.66	0.29	24	27
[-5, 0]	-0.04***	-15.13	0.15	22	29
[-2, 0]	-0.01***	-43.23	0.08	19	32
[-1, 0]	-0.16***	-70.89	0.05	22	29
[0, 0]	-0.13***	-110.74	0.02	22	29
[-1, 1]	-0.24***	-80.59	0.07	21	30
[-2, 2]	-0.07***	-48.72	0.13	20	31
[-5, 5]	-0.08***	-13.49	0.29	26	25
[-10, 10]	-0.33***	-9.77	0.60	25	26
[-20, 20]	0.92***	4.14	1.30	28	23
C. Remaining domestic banks					
[-20, 0]	0.66**	2.62	0.70	25	17
[-10, 0]	-0.10	0.52	0.34	22	20
[-5, 0]	0.64***	33.92	0.18	22	20
[-2, 0]	-0.32***	-17.98	0.09	18	24
[-1, 0]	-0.38***	-57.65	0.06	21	21
[0, 0]	-0.24***	-51.23	0.03	23	19
[-1, 1]	-0.48***	-64.13	0.09	20	22
[-2, 2]	-0.43***	-17.31	0.15	21	21
[-5, 5]	0.82***	26.43	0.34	27	15
[-10, 10]	0.56***	10.00	0.70	27	15
[-20, 20]	2.08***	9.07	1.52	28	14

Note: This table shows the results for the regression equations (3.1) and (3.2). The table reports cumulative abnormal returns,  $J_1$  statistics, standard deviation of returns, and the number of positive and negative abnormal returns. To calculate abnormal returns we relied on the aggregated coefficient method which we applied to the estimation period of 150 days prior to the 41 day event window.

Our results show that the announcements were already anticipated by the market. The CARs for 20 days prior to acquisitions  $[-20, 0]$  are about 4% and are higher than those for the  $[-20, 20]$  event period. Figure 3.1 shows that CARs of target banks increase by 6%, then fall by approximately 2% and stabilize at around 4%. The anticipation of acquisitions is a common finding in the literature and was reported by numerous other M&A studies (e.g. Cybo-Ottone and Murgia (2000)).

In the next step following Bessler and Murtagh (2002), we estimate CARs for the non-participating banks for the 41 days surrounding the announcement date. The results are presented in Panel B of Table 3.3. We find that the shareholders of non-participating banks also experience positive abnormal returns that equal about 1%, which is consistent with the market power hypothesis. To test whether the remaining domestic banks might anticipate their acquisitions, we separately investigate their reaction and the results are presented in Panel C of Table 3.3. As expected, we observe positive and significant CARs of around 2% in the 41 days event window, which is higher than the results for all other non-participating banks. Interestingly, abnormal returns calculated for smaller event windows are often negative.

With respect to political and legal changes we study whether the market reaction changed significantly since 1998, when restrictions on foreign ownership were repealed. At an early stage of transition many privatisation deals were characterized by delays and a persistent involvement of the State Treasury in the governance of privatised banks (Abarbanell and Bonin (1997)). Therefore, we would expect that earlier transactions created less value for shareholders. To investigate this aspect we calculate CARs separately for deals conducted before and after 1998 and test the hypothesis whether the differences between them equal zero. The results are presented in Table 3.4. When looking at the test statistics no definite conclusions can be drawn from the results. The findings are mixed and are highly sensitive to the chosen event window.

To analyse the long-term wealth effects of foreign acquisitions, we calculate abnormal returns for 201 days surrounding the announcement date. The findings are reported in Figure 3.2 and Table 3.5. CARs for the target banks peaked at 10% just following the announcement, but have shown only 2.3% increase in the long-run. The shareholders of all non-participating banks have observed negative CARs. However, these results are driven by rival foreign banks since the remaining domestic banks exhibit slightly positive abnormal returns over the long time period. Because none of the long-term results are statistically significant, they should be treated with caution.



Table 3.4: CARs for Transactions Announced Before 1998 and After 1998

	Before 1998	After 1998	t-statistic
<b>A. Target Banks</b>			
[-20, 0]	2.38	4.46	-0.74
[-10, 0]	2.65	2.85	-0.14
[-5, 0]	1.56	3.56	-2.71***
[-2, 0]	0.77	2.01	-3.32***
[-1, 0]	-0.17	1.48	-6.43***
[0, 0]	1.10	1.47	-2.99***
[-1, 1]	2.42	2.95	-1.30
[-2, 2]	4.12	3.02	1.65
[-5, 5]	4.48	3.71	0.53
[-10, 10]	7.50	1.97	1.95*
[-20, 20]	4.76	3.37	0.23
<b>B. All other Banks</b>			
[-20, 0]	2.34	-0.03	2.63***
[-10, 0]	1.38	-0.22	3.59***
[-5, 0]	0.50	-0.13	2.72***
[-2, 0]	0.12	-0.01	1.11
[-1, 0]	-0.35	-0.10	-3.34***
[0, 0]	-0.77	0.03	-21.07***
[-1, 1]	-0.01	-0.29	2.44**
[-2, 2]	0.99	-0.30	6.66***
[-5, 5]	1.13	-0.34	3.28***
[-10, 10]	0.73	-0.50	1.35
[-20, 20]	3.43	0.34	1.54
<b>C. Remaining Domestic Banks</b>			
[-20, 0]	-0.05	0.88	-1.03
[-10, 0]	0.34	-0.24	1.33
[-5, 0]	0.34	0.73	-1.69*
[-2, 0]	-0.76	-0.19	-5.14***
[-1, 0]	-1.02	-0.18	-11.36***
[0, 0]	-0.65	-0.12	-14.54***
[-1, 1]	-0.89	-0.36	-4.74***
[-2, 2]	-0.72	-0.34	-1.97*
[-5, 5]	1.30	0.66	1.45
[-10, 10]	2.25	0.03	2.45**
[-20, 20]	3.59	1.62	1.02

Note: This table shows the results for the regression equations (3.1) and (3.2). The table reports cumulative abnormal returns separately for transactions that took place before and after 1998. To calculate abnormal returns we relied on the aggregated coefficient method which we applied to the estimation period of 150 days prior to the 41 day event window. The third column presents t-statistics for the null hypothesis that the difference between cumulative abnormal returns before and after 1998 equals zero.

Figure 3.2: Cumulative Abnormal Returns for Target and Other Banks (201 Days Event Window)

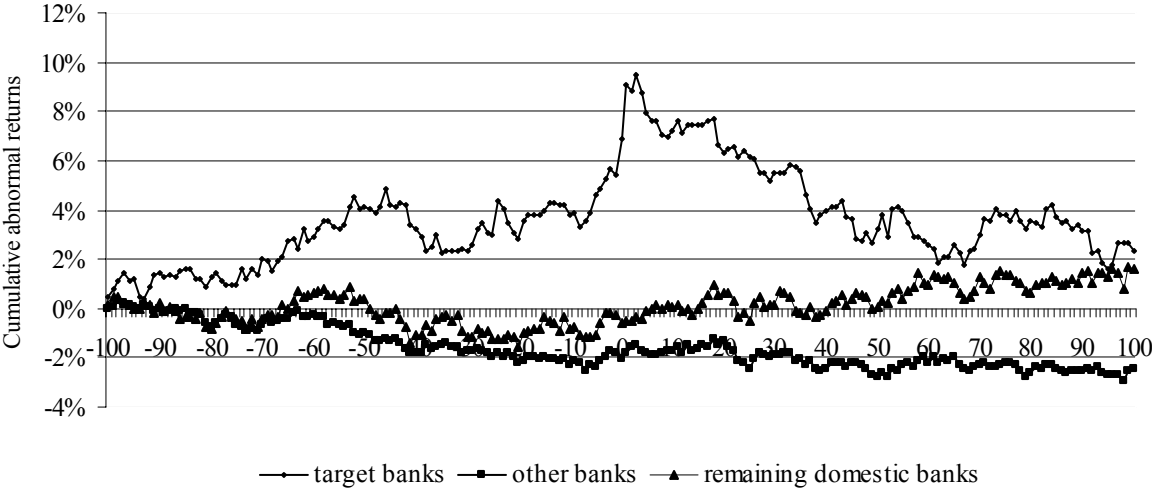


Table 3.5: Estimation Results on Cumulative Abnormal Returns (201 Days Event Window)

	CAR in %	$J_1$	S.D. in %	Positive	Negative
<b>Target banks</b>					
[-100, 100]	2.30%	0.81	39.65	22	26
<b>Other banks</b>					
[-100, 100]	-2.82%	-0.95	19.38	23	28
<b>Remaining domestic banks</b>					
[-100, 100]	1.6	-1.15	26.37	20	21

Note: This table shows the results of an event study analysing the reaction of 48 Polish banks to being acquired by foreign investors. Three banks were excluded from the analysis because their stocks were not listed on the Warsaw Stock Exchange 351 days prior to the event day. Additionally, the reaction of other banks and the remaining domestic banks is reported. The table reports cumulative abnormal returns,  $J_1$  statistics, standard deviation of returns, and the number of positive and negative abnormal returns. To calculate abnormal returns we relied on the aggregated coefficient method which we applied to the estimation period of 150 days prior to the 201 day event window.

**3.5.2 Regression Analysis**

Table 3.6 documents the results of the regression equation (3.3) to investigate the determinants of the CARs. Using CARs over different event windows as the dependent variable we provide a check of robustness. The regressions are run with and without year dummies in order to reflect the changes during the analysed time period.

Table 3.6: Summary of the Regression Results

	[-20, 20]	[-20, 20]	[-10, 10]	[-10, 10]	[-5, 5]	[-5, 5]	[-2, 2]	[-2, 2]	[-1, 1]	[-1, 1]
<i>Share</i>	0.00	-0.03	0.02	0.00	0.06**	0.06*	0.07***	0.07**	0.06***	0.05**
<i>Capitalization</i>	-0.05**	-0.06*	-0.06***	-0.06**	-0.03***	-0.04**	-0.03***	-0.03**	-0.02**	-0.02*
<i>D</i> <sub>1996</sub>		0.45**		0.45***		0.31***		0.26***		0.16**
<i>D</i> <sub>1997</sub>		0.41*		0.42**		0.22*		0.18*		0.14*
<i>D</i> <sub>1998</sub>		0.37		0.37*		0.27**		0.23**		0.16**
<i>D</i> <sub>1999</sub>		0.57**		0.53***		0.31**		0.25**		0.19**
<i>D</i> <sub>2000</sub>		0.49*		0.47**		0.32**		0.23**		0.14*
<i>D</i> <sub>2001</sub>		0.46		0.47**		0.28*		0.19*		0.11
<i>D</i> <sub>2002</sub>		0.34		0.40**		0.24*		0.17*		0.09
<i>F</i>	2.78*	1.31	6.79***	2.06*	11.51***	3.88***	18.43***	5.65***	15.76***	6.02***
<i>R</i> <sup>2</sup>	17.07	36.03	33.46	46.93	46.03	62.44	57.72	70.76	53.85	72.07
$\bar{R}^2$	10.92	8.62	28.53	24.18	42.03	46.34	54.59	58.23	50.44	60.10

Table 3.6: Summary of the Regression Results (Continued)

	[-20, 0]	[-20, 0]	[-10, 0]	[-10, 0]	[-5, 0]	[-5, 0]	[-2, 0]	[-2, 0]	[0, 0]	[0, 0]
<i>Share</i>	-0.00	-0.04	0.01	-0.02	0.04**	0.02	0.05***	0.03**	0.04***	0.03***
<i>Capitalization</i>	-0.03*	-0.04**	-0.02*	-0.03*	-0.01	-0.02	-0.01	-0.01	-0.01**	-0.01**
$D_{1996}$		0.30**		0.19**		0.12*		0.07		0.08**
$D_{1997}$		0.20		0.15		0.08		0.01		0.08*
$D_{1998}$		0.28*		0.18*		0.12		0.05		0.08*
$D_{1999}$		0.44***		0.30***		0.19**		0.12**		0.13***
$D_{2000}$		0.38**		0.22*		0.16*		0.06		0.09**
$D_{2001}$		0.29*		0.20		0.11		0.05		0.07
$D_{2002}$		0.29*		0.17		0.10		0.05		0.07*
$F$	1.95	2.16*	2.74*	2.22*	4.39**	3.44***	10.13***	5.18***	17.11***	8.36***
$R^2$	12.65	48.08	16.86	48.77	24.53	59.57	42.88	68.93	55.89	78.18
$\bar{R}^2$	6.18	25.83	10.70	26.82	18.94	42.24	38.65	55.61	52.62	68.82

Note: This table reports results on the regression analysis (3.3). The dependent variables are defined as cumulative abnormal returns for the different event windows. *Share* is the ratio of transaction value to capitalization and *Capitalization* the logarithm of capitalization of a given bank stock on the Warsaw Stock Exchange on the last day of the month previous to the deal.  $D_t$  are year dummies for the years  $t = 1996, \dots, 2002$ .  $F$  denotes the  $F$ -test of joint significance of the coefficients.  $R^2$  and  $\bar{R}^2$  are the coefficients of determination. \*, \*\*, \*\*\* denote statistically significant coefficients at the 10%, 5% and 1% level, respectively.

The results show that the larger the share of the acquired capital, the higher the wealth effect enjoyed by shareholders of target banks. The results are statistically significant at least at the 10% confidence level for the event windows [-5, 5], [-2, 2], [-1, 1], [-5, 0], [-2, 0], [0, 0] and insignificant for the other event windows. This finding confirms the expectation that the benefits of foreign ownership can only materialize when a foreign bank has full control over an acquired institution. Very large banks, on the other hand, can be very difficult to restructure and thus we can anticipate smaller wealth enhancements for large institutions. As can be observed from the findings in Table 3.6, the size of a target bank, measured by its market capitalization, is negatively related to market valuation of the deal, confirming this prediction.

### **3.6. Conclusions**

In 1998 the regulation of financial markets in Poland was liberalized allowing foreign banks to enter without any restrictions. In this paper, we investigate the stock market valuation of foreign acquisitions of Polish banks between 1996 and 2002. In our study, the focus lies not only on the reaction of target bank stocks, but we also measure abnormal returns for the non-participating banks. The novel aspect of this study is the focus on the reaction of the remaining domestic banks to foreign acquisitions of their peers.

Our results indicate that foreign acquisitions created wealth for participating banks in the short-run. The shareholders of target banks experienced an almost 4% increase in the stock value during 41 days surrounding the announcement date. It is noteworthy that deals where large shares had been transferred into foreign control exhibited significantly higher abnormal returns. The long-term effects were also positive albeit not significant. Thus, the shareholders of target banks anticipated that foreign owners would render acquired banks more profitable, confirming the hypothesis that foreign bank ownership in transition countries adds value. This finding is in line with the results produced by numerous studies employing other methodologies (Hasan and Marton (2003), Isik and Hassan (2002), Grigorian and Manole (2002), Claessens et al. (2001), Bhattacharyya et al. (1997)).

When foreign acquisitions were announced, the shares of non-participating banks also experienced positive wealth effects in the short-run. The effect was much higher for the non-participating domestic banks, indicating that their shareholders anticipated foreign acquisition of the remaining domestic institutions. This could also explain why there was a significant price increase for the participating banks prior to announcements.

## **Chapter 4: Consolidation of the Polish Banking Sector: Consequences for the Banking Institutions and the Public**

### **4.1. Introduction**

The Polish banking sector is experiencing a period of rapid development caused by the alignment of its banking legislation with the requirements of the European Union (EU). While most of the EU Banking Directives have already been implemented, the Second Banking Directive will only come into force after Poland's accession to the EU. From then onwards EU banks will have the right to open branches in Poland with only the consent of their home-country supervisory authority and, thus, Polish banks will face competition from their EU counterparts. This upcoming event is forcing banks to devise new ways to ensure their viability in the new competitive environment. Broadly speaking, there are two ways to enhance the efficiency and profitability of a bank. One way is to try to reform a bank from the inside, the second is to take part in a merger or acquisition with the hope that the efficiency of an acquiring bank will be extended to the target bank. Taking into account the inertial nature of the banking industry, many Polish banks opt for the second response to competitive pressure.

While there has been considerable research on the effects of M&As, no agreement has been reached, as to whether or not, the ongoing consolidation process in the world has benefited the financial industry (see Berger et al. (1999) for a comprehensive survey). The predominant part of the existing research focuses on the US, and to a lesser degree on European markets. No research, to our knowledge, has yet been carried out on accession countries. Hence, this study is the first attempt to fill this gap and analyze the consolidation process in Poland<sup>21</sup>.

Merger studies usually employ one of three main methodologies. One string of research focuses on the performance and cost ratios before and after the mergers in order to capture revenue synergies or cost reductions in the new institutions (Vennet (1996)). Other studies evaluate changes in X-efficiency that were brought about by mergers (Cuesta and Orea (2002)). Event studies usually assume that an efficient capital market properly predicts the results of future mergers and, therefore, could be used to gauge the effect of consolidation. None of the above studies, however, support the hypothesis that mergers have a beneficial effect on merged banks and the banking system as a whole. Nevertheless, the merger activity continues unabated and practitioners persist in their praise of its benefits.

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<sup>21</sup> The exception constitutes the paper by Kokoszczynski (2001), where a description of the ongoing consolidation process in Poland is given without statistically measuring its effects.

Recently a few studies were undertaken (Rhoades (1998); Avkiran (1999)) that analyze a small number of M&As and apply three methodologies simultaneously. The case study approach followed by these studies allows us to consider the problem from all possible angles and to use not only quantitative data, but also gain additional insight from “soft” information. Given the small number of mergers in the Polish banking sector, we have a chance to undertake a comprehensive study of the consolidation process including in the analysis all three above mentioned methodologies.

The data for the study is taken from *Polski Monitor B*, an official publication of the Polish government, and the obtained sample covers 98% of the total banking assets for the years 1995-2001, which makes it the most comprehensive database on the Polish banking system. In this paper we focus on seven mergers and two acquisitions that took place between 1997-1999. The event study methodology, however, was applied to seventeen deals that have taken place between 1997-2001.

Despite the small number of analyzed deals and the short time period under consideration, a study of the consequences of M&A activities in Poland is warranted for a number of reasons. First, implications from banking markets of the US and EU cannot be directly extended to a transition country because of the differences in their political, economic, and structural background. Second, the M&A activity in Poland is accelerating (IMF Country Report (2001)), which only reinforces the urgency for evaluation of the deals that have taken place so far. Third, up to 27% of total banking assets were involved in M&A activity in Poland, which adds to the systemic risk of the financial system (Berger et al. (1999)). Hence, it is essential to measure the trade-off between the benefits stemming from consolidation and the burden that is imposed by it.

The remainder of the paper is structured as follows. Section 4.2 describes structural changes that have taken place in the Polish banking market and classifies completed M&A. This section should serve as a background for the discussion that follows. In the Section 4.3 different methodologies used in the study are explained, namely event study, profit and cost ratio analysis, and the Malmquist index. Section 4.4 presents the data, and Section 4.5 provides empirical results of the investigation. Finally, Section 4.6 draws some conclusions.

#### **4.2. Structure of the Polish Banking System**

After the generous licensing environment of the first few transitional years, beginning from 1998 the number of commercial banks in Poland has been steadily declining. There have been only a few bank liquidations and the decreasing trend is due to the consolidation process.

As a result, at the end of 2001 there were 71 commercial banks left. As shown in Table 4.1, the decreasing number of banks was not followed by a decreasing number of branch offices. This indicates that banks are seeking opportunities to strengthen their market position not only through mergers, but also by expanding their customer network. Therefore, the public has not suffered from a reduced availability of banking services.

Table 4.1. Summary statistics of Polish banking structure for the years 1996-2001

	1996	1997	1998	1999	2000	2001
Number of commercial banks <sup>1)</sup>	81	83	83	77	74	71
Of which: foreign-owned banks	25	29	31	39	47	48
Number of banks included in the dataset	66	66	63	73	70	48
Number of branch offices <sup>2)</sup>	1580	1629	1864	2235	2449	2878
Herfindahl Index						
for assets	0.08	0.08	0.08	0.08	0.08	0.09
for deposits	0.11	0.12	0.13	0.12	0.12	0.12
for loans	0.06	0.06	0.06	0.07	0.08	0.09
CR5						
for assets	48.8	46.2	42.9	47.7	46.5	51
for deposits	52.3	51.9	51	55.4	54.7	55.5
for loans	43.8	41.4	35.7	46.1	46.1	47.9

1) Excluding banks declared bankrupt or under liquidation. Cooperative banks are also excluded.

2) Excluding head offices and representative offices.

Source: NBP statistics, and author's own calculations.

To measure concentration in the Polish banking system, we have used the Herfindahl Index (HI) and the Concentration Ratio of the five biggest banks (CR5). Since the HI is calculated as the sum of squared market shares in terms of assets, deposits, and loans, it takes into account the structure of the whole banking system including tails of banking institutions. The CR5, on the other hand, is the market share of the five biggest institutions, excluding the rest of the banks. The results for both the indicators are presented in Table 4.1. The HI is quite stable over the years analyzed, and its range from 0.06 to 0.13 shows a medium level of concentration<sup>22</sup>. The deposit market exhibits the highest, whereas the loan market - the lowest level of concentration. The market share of the five biggest banks decreased during the initial years, but due to vibrant consolidation activity increased in 1999<sup>23</sup> and 2001. Higher concentration can be a desirable feature, since large banks will be better placed to compete successfully once Poland joins the EU (Wagner and Iakova (2001)).

<sup>22</sup> According to the Banking Supervision Committee of the European System of Central Banks (ECB, (2000)) a HI above 0.18 indicates high level of concentration. Among European countries the highest level of concentration for the year 1999 was experienced in Finland, Netherlands and Sweden (their HI in terms of assets were 0.19, 0.17 and 0.19, respectively).

<sup>23</sup> This was the year when the megamerger of PEKAO Group took place, creating the second largest Polish bank in terms of assets.



There are four major reasons for consolidation in the Polish banking sector. During the initial stage of privatization some banks acquired weaker or troubled banks for a low price and subsequently incorporated them into their own structure. This was the driving force behind, for example, the merger of Powszechny Bank Kredytowy SA and Pierwszy Komercyjny Bank SA, or Bank Energetyki SA and Bank Inicjatyw Społeczno-Economicznych SA. Since the banking sector was becoming more competitive, some small banks were looking for mergers in order to increase their market share. This was the motivation behind mergers such as Wielkopolski Bank Kredytowy SA and Gliwicki Bank Handlowy SA, as well as Gospodarczy Bank Wielkopolski SA and Bałtycki Bank Regionalny SA. The above mergers can be considered to have been driven by market forces.

Many foreign banks (Bank Austria Creditanstalt, ING, Citibank) commenced their operations in Poland by opening branches or creating subsidiaries. Later these banks were active participants during the privatization process and acquired many large Polish banks with wide branch networks as a way of fast expansion. During the past few years there was a merger wave of these banks that has almost exhausted itself<sup>24</sup>.

International consolidation has also influenced the structure of the Polish banking sector. When Bank Austria Creditanstalt and Hypovereinsbank, investors in Powszechny Bank Kredytowy SA and Bank Przemysłowo-Handlowy SA, respectively, made a decision to merge, their Polish institutions also consolidated creating the bank BPH PBK SA. Finally, the PEKAO merger is a special case that should be mentioned because it is the legacy of the unsuccessful administrative consolidation plan (for more details see Balcerowicz and Bratkowski (2001)).

Table 4.2 presents the basic statistics about M&As during the 1997-2001 period. The number of mergers as well as their value has been increasing lately, enabling us to talk about a merger wave. There is also reason to believe that consolidation will continue, especially among smaller banks at the tail end of the sector (IMF Country Report (2001)). The value of M&A transactions in the years 1999, 2000, and 2001 constituted a very large part of total banking assets (25, 10, and 27 percent, respectively). This has significant implications for regulators since during a merger wave transition risk makes banking systems more vulnerable (particularly during a financial crisis) and the need for prudent supervisory practices becomes especially important.

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<sup>24</sup> The exception is Deutsche Bank that has decided not to merge the banks under its control and currently is represented on the Polish banking market by two banks: Deutsche Bank Polska SA and Deutsche Bank 24 SA.

Table 4.2. Summary statistics of mergers and acquisitions that took place during 1997-2001 among Polish banks

	Number of M&A	Distribution of the number of M&A (in percent) <sup>1)</sup>	Value of M&A (in thousands of PLN)	Distribution of the value of M&A (in percent) <sup>1)</sup>	M&A as percent of the total Polish banking assets
1997	2	9	17 234 982.40	5	7
1998	2	9	29 138 349.73	9	3
1999	5	23	94 491 522.69	30	25
2000	5	23	46 757 940.48	15	10
2001	8	36	132 316 043.90	41	27
Total	22	100	319 938 839.20	100	15

Source: NBP statistics, and author's own calculations.

<sup>1)</sup> Numbers are derived by dividing the number (value) of transactions during given year by the number (value) of transactions between 1997-2001.

### 4.3. Methodology

To analyze the effect of mergers on stock prices, we conduct a traditional event study<sup>25</sup>. We define the event day as the day when the first official announcement by the Security and Exchange Commission or bank itself about a possible merger was made<sup>26</sup>. To compute abnormal returns we follow the market model that is most commonly used in M&A analysis. Using Ordinary Least Squares, we estimate the model parameters during a period of 242 trading days prior to the event window. This period encompasses almost one year and is sufficient for our purposes. As a proxy for market returns we use WIG, market index representing all stocks listed on the Warsaw Stock Exchange<sup>27</sup>. To calculate cumulative abnormal returns (CARs) we use event windows of various intervals: [-10, +10], [-5, +5], [-1, +1], [-10, 0], and [-5, 0]. Choosing a wide range of event windows allows us to compare immediate and subsequent results of the announcement. Additionally, we are able to directly compare our results with other studies.

To measure the effect of the merger on the performance of the bank, we compare the post-merger financial ratios relative to the control group with pre-merger ratios relative to the

<sup>25</sup> For more details about the methodology employed in the paper see Campbell et al. (1997).

<sup>26</sup> In cases when there were a few bidders, this was the date when the decision regarding the future acquiring bank was taken during target bank's shareholder meeting. The only unofficial announcement was used in the case of merger of Kredyt Bank SA and Polski Bank Inwestycyjny SA, which was followed in 4 days by the official statement from the Kredyt Bank SA.

<sup>27</sup> We also tried to use WIG20, index that combines 20 large blue-chip Polish companies, as a market index, but the wealth effects were markedly undervalued, implying the existence of contagion effect for the other bank stocks. As it is explained in Cybo-Ottone and Murgia (2000), when a bank merger is announced other banks' stock prices can also increase either due to higher market concentration that would lead to higher profits or because other banks can also be expected to be acquired. Thus, the index that contains many bank stocks (the share of bank stocks in the total market capitalization of the Warsaw Stock Exchange climbed from 34.5% in 1997 to 42.6% in 2001) would rise as well, reducing excess returns.

control group. We define this as the Change in Relative Operating Ratio (CROR) and compute it using the following formula:

$$CROR = [\overline{X}_{AI} - \overline{X}_A^{Control}] - [\overline{X}_{BI} - \overline{X}_B^{Control}] \quad , \quad (4.1)$$

where  $\overline{X}$  is the average financial ratio analyzed, the subscript A stands for after-merger, subscript B for before-merger, I denotes an individual bank, and Control the control group.

We compute average ratios for each bank and the control group for two years before the merger, and two years after the merger. We omit the year of the merger because we consider it to be a transitional period. Due to the nature of the Polish market, we assume that the integration process is relatively quick. In some cases two years might seem too short, however, interviews confirm that 50% of all cost savings occur within the first year after a merger (Rhoades (1998)). Similarly, annual reports attribute increased expenses to M&A activity only in the first year after consolidation. As a control group, we use Polish banks which have not participated in merger activity in the same year as the analyzed merger. Additionally, we excluded banks whose activities differ from the universal banking model<sup>28</sup>.

Following Rhoades (1998) and Avkiran (1999), we have chosen seven financial ratios to analyze costs, profitability, risk, and market power. Non-interest expenses are the most often cited by practitioners as those directly affected by mergers. We employ two expense ratios which we scale according to total assets in order to show not just change in costs, but also in efficiency, namely *overhead expenses/total assets* and *expenses on physical capital/total assets*. To trace the development of the loan portfolio quality, we consider the development of *loan loss provisions/total loans* ratio. Consolidation could also improve risk management through better diversification. Hence, we analyze *earning assets/total assets* that could be increased due to the merger, as larger banks' sizes might lead to greater diversification and, therefore, less need to hold large amounts of liquid, but non-profitable assets. Moreover, scale economies also dictate smaller amount of fixed assets. The analyzed profitability ratio is *return on assets (ROA)*.

We also analyze the changes in market power in terms of deposits. On the one hand, when accompanied by higher cost-efficiency, this measure could be a proxy for the transfer of benefits to the public. The logic behind this is that more efficient institutions will be able to attract more deposits by offering better returns, as well as higher quality of services (Avkiran (1999)). On the other hand, higher market power could lead to the abuse of monopoly power, which goes at the expense of the public.

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<sup>28</sup> We have excluded only four car banks (Ford Bank, Volkswagen Bank, Fiat Bank and Opel Bank), so the remaining banks are of comparable business focus since all banks in Poland follow the universal banking model.

To measure the efficiency of the merged banks in Poland, we employ Data Envelopment Analysis<sup>29</sup> (DEA), which was developed by Charnes et al. (1978). This methodology was used in numerous studies and is considered to be suitable for transition economies (Grigorian and Manole (2002)). Following many recent studies (Chu and Lim (1998); Gilbert and Wilson (1998); Kraft and Tirtiroglu (1998); Rezvani and Mehdi (2002); Isik and Hassan (2002)) we employ intermedial approach (Sealey and Lindley (1977)). Accordingly, we specify two outputs (loans and government bonds) and three inputs (fixed assets, labor and deposits). All variables are measured in thousand of Polish zlotys.

In order to identify changes in efficiency and productivity over time we compute the Malmquist index, which decomposes the total factor productivity change into the change in the technical efficiency and the shift in the efficiency frontier or technology. Under the assumption of variable returns to scale, we can further decompose the change in technical efficiency into pure technical efficiency and scale efficiency changes. When the Malmquist index takes the value of one, we talk about no change in the productivity. Index values larger or smaller than one represent improvements or deterioration of productivity<sup>30</sup>. In order to calculate the change in the index for a merged institution we multiply indices for the year when the transaction took place and two years thereafter<sup>31</sup>.

#### **4.4. Data**

For our investigation we draw data from various sources. The balance sheet and income statement data are taken from Monitor Polski B, an official publication of the Polish government. Table 4.1 presents the number of banks which are included by our dataset. Even though we had to omit a few banks due to unavailable data, our sample covers around 98% of all banking assets. Information on completed mergers comes from the annual “Summary

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<sup>29</sup> Our preference for DEA is driven by many factors. The chief advantage of DEA is that no explicit functional form is imposed on the data and it performs well under a small number of observations. In our study we calculate the efficient frontier separately for each year. As it can be seen in Table 4.1, the number of observations used in our paper exceeds most banking efficiency studies that employ DEA (Sathye, (2001)). However, the disadvantage of using this method is its extreme sensitivity to outlying observations, which is why we have to perform some sensitivity tests.

<sup>30</sup> To understand how the Malmquist index should be interpreted let us look at the results for bank PBK in Table 6. The Malmquist index for technical efficiency change (TEC) is 1.03 and for technology change (TC) – 0.95. This means that the technical efficiency of PBK improved after the merger by 3% relative to other banks. However, at the same period the efficient frontier shifted inward by 5%, which caused the total factor productivity (TFP) to deteriorate by 3% ( $TFP=TEC*TC=1.03*0.95=0.97$ ). Further decomposing technical efficiency change into pure technical efficiency (PTEC) and scale efficiency (SEC) changes we can observe constant pure technical efficiency and a 3% improvement in the scale efficiency ( $TEC=PTEC*SEC=1.00*1.03=1.03$ ).

<sup>31</sup> In this case we include the year of the transaction. Since most of the costs associated with mergers occur during this year, its exclusion would bias the results upward.

evaluations of the financial situation of Polish banks”, published by the General Inspectorate of Banking Supervision. Stock prices of the listed banks were provided by the Warsaw Stock Exchange. In order to determine the announcement dates of the mergers and acquisitions, we searched the Polish daily newspaper “Rzeczpospolita”. Additional “soft information” about mergers and acquisitions was collected from annual reports and newspaper articles.

Table 4.3. List of M&A that have taken place in Poland during 1997-1999

The name of the new institution (institutions in case of acquisition)	Names of the participating institutions	Total assets of the new institution(s) in thousands zloty	Year of the M&A
<b>Mergers</b>			
1. Kredyt Bank SA	Kredyt Bank SA, PBI, and Prosper Bank SA	6 375 106.36	1997
2. BIG Bank Gdanski SA	Bank Inicjatyw Gospodarczych and Bank Gdanski SA	8 163 428.80	1997
3. BRE Bank SA	Bank Rozwoju Eksportu and Polski Bank Rozwoju SA	8 012 447.50	1998
4. Powszechny Bank Kredyto SA	Powszechny Bank Kredyto SA and Pierwszy Komercyjny Bank SA	16 382 327.73	1999
5. Bank Inicjatyw Spooleczno-Economicznych SA	Bank Inicjatyw Spooleczno-Economicznych SA and Bank Energetyki SA	868 750.35	1999
6. PEKAO SA	Bank Polska Kasa Opieki SA, Powszechny Bank Gospodarczy SA, Pomorski Bank Kredytowy SA and Bank Depozytowo Kredytowy SA	45 561 753.97	1999
7. Bank Przemyslowo-Handlowy SA	Bank Przemyslowo-Handlowy SA and HypoVereinsbank Polska SA	14 736 336.06	1999
<b>Acquisitions</b>			
8. Bank Handlowy w Warszawie SA and Bank Rozwoju Cukrownictwa SA	Bank Handlowy w Warszawie SA and Bank Rozwoju Cukrownictwa SA	17 270 867.82	1998
9. Bank Pocztowy SA and Wielkopolski Bank Rolniczy SA	Bank Pocztowy SA and Wielkopolski Bank Rolniczy SA	632 298.96	1999

Source: NBP publications, Polish daily newspaper “Rzeczpospolita”.

Our dataset encompasses balance sheet, income statement, and stock price data for the period from 1995 to 2001. Due to the fact that two of our methodologies (ratios and X-efficiency analysis) require two years after the transaction in order to evaluate its impact, we mostly focus on nine M&A that took place between 1997 and 1999. The exception is the event study that we perform on all bank stocks (seventeen events) that were involved in consolidation activity between 1997-2001.

We define a merger as a transaction when two or more banks merge their activities and as a result one new institution emerges. In acquisitions, banks continue to be separate entities even though the acquiring bank may have full control over the acquired one. In our study we include only those deals where controlling interest (over 50% of equity) was

transferred to the acquiring bank. If two mergers or acquisitions involving the same banks took place during the same year, they are considered as one transaction.

Obviously, we are aware of the data problems that are prevalent in all transition countries. Accounting standards are not strictly enforced and noncompliance to rules set by the supervisory authorities is widely spread. However, we believe that such behavior is equally practiced by all market participants and, therefore, should not influence the results. Another difficulty is the unequal treatment of state and private banks. There is anecdotal evidence that supervisory authorities are more lenient in their treatment of state banks (Grigorian and Manole (2002)). Thus, when analyzing the empirical findings, we should keep this bias in mind.

#### **4.5. Empirical Results**

The summary of our findings is presented in Tables 4.4 to 4.6. We look at each computed measure separately and compare our results with the results of other studies. Additionally, we try to add some more insights by analyzing the results for each bank separately.

##### **4.5.1 Event Study**

We perform an event study for all M&As that took place between 1997-2001 when at least one participating bank was listed on the Warsaw stock exchange one year prior to the announcement. We were able to identify seventeen events and the summary of the stock market reactions is presented in Table 4.4. In order to facilitate comparison with other methodologies, we present findings separately for each M&A that took place between 1997-1999, but the aggregated results include all bidding (ten events) and target (seven events) banks between 1997-2001.

The aggregated results in Table 4.4 show that the market reacted mostly positively to M&A announcements. Over the 21 day event window abnormal returns constituted 3.68% for all bank. Shareholders of the target banks experienced a 7.23% increase in stock price, whereas the wealth effect on the bidder stocks was not significant, albeit also positive. Our findings are broadly consistent with other studies undertaken in the last ten years, which indicate that bidder banks experience nonsignificant or negative, while target banks – positive CARs.

Table 4.4. Cumulative Abnormal Returns of the banks, participating in the M&A

	More than one bidder?	Event window				
		[-10;+10]	[-5;+5]	[-1;+1]	[-10; 0]	[-5; 0]
KB (bidder)	Yes	6.82***	7.87***	9.21***	10.52***	-9.97***
BIG (bidder)	No	-14.98***	-13.31***	8.01***	-7.37***	-1.12*
BRE (bidder)	Yes	-7.85***	-0.48	4.22*	-6.57***	-10.44***
PBK (bidder)	Yes	26.47***	33.67***	0.26	18.67***	25.81***
PBR (target)	Yes	30.82***	30.24***	-2.14	5.25***	7.11***
BPH (target)	No	-18.99***	-10.71***	8.57***	3.28***	12.25***
BHW (bidder)	No	-1.32	4.86***	3.98***	-1.91***	3.98***
All banks <sup>1)</sup>		3.68***	5.01***	3.15***	4.31***	4.61***
Bidders (10)		1.20	7.52***	5.28***	2.05***	5.57***
Targets (7)		7.23***	1.44**	0.12	7.54***	3.23***

1) The aggregated data includes CARs for all banks that have participated in M&A during 1997-2001 and were listed one year before the announcement date.

Market model and estimation window of 242 trading days are used for calculations of abnormal returns. Tests for significance are shown, with \*\*\*, \*\* and \* indicating 1%, 5% and 10% significance levels of t-statistic, respectively.

It is noteworthy that the market reacts prior to the announcement: the results for the 21 surrounding days are strikingly similar not only in sign, but also in magnitude with the results of 10 days prior to the announcement. Anticipation of the announcement is not new in the merger literature, similar findings were also observed by Beitel et al. (2004) and Cybo-Ottone and Murgia (2000).

Now we turn our attention to the analysis of the shares of seven banks participating in the M&A activity between 1997-1999. We observe that three out of five stocks of bidder banks were considered value destroying by shareholders. In the case of Kredyt Bank SA and Powszechny Bank Kredytowy SA the price went up, but there could be another explanation. In these cases there were a few bidding banks competing with each other for the right to acquire a target bank. On the day of announcement it was declared which bidder was selected to become the acquiring bank. Thus, the positive response of the market to some merger announcements could be caused by the victory over other bidders. This explains also why almost all bidder banks experience on average 5.28% abnormal returns over three days surrounding the announcement, whereas abnormal returns of target banks during this period are insignificant or even negative depending on the benchmark.

The results for two target banks, Polski Bank Rozwoju and Bank Przemyslowo-Handlowy SA (BPH SA), are mixed. Polski Bank Rozwoju at the time of the merger was experiencing financial trouble. It was therefore predictable that this projected merger was positively greeted by shareholders. In the case of the second target, BPH SA, after the announcement of its acquisition by the HypoVereinsbank Polska SA, shareholders experienced negative returns over 21 day event window.

#### 4.5.2 Analysis of the Financial Ratios

Now we turn to the analysis of the financial ratios. The summary of the empirical findings is presented in Table 4.5. It should also be mentioned that the CRORs presented show the direction and strength of the change of the ratios, but cannot be used to compare one merged bank with another.

Table 4.5. Changes in the Relative Operation Ratios (CRORs) and market power (in percent) of the banks, participating in the M&A activity

	Acquiring bank more efficient than target <sup>1)</sup>	ROA	Earning Assets/ Total Assets	Provisions/ Loans	Depreciation/ Total Assets	Overhead/ Total Assets	Market power
<b>Mergers</b>							
KB	<b>NO</b>	<b>2.14</b>	<b>1.68</b>	2.93	<b>-0.16</b>	<b>-0.53</b>	-0.66
BIG	<b>YES</b>	<b>0.48</b>	<b>2.59</b>	<b>-2.57</b>	<b>-0.09</b>	<b>-0.68</b>	-1.69
BRE	<b>YES</b>	<b>2.18</b>	-2.85	3.23	0.03	<b>-0.22</b>	<b>1.05</b>
PBK	<b>YES</b>	-0.59	<b>0.20</b>	1.02	0.18	0.23	-0.56
BISE	<b>NO</b>	<b>0.69</b>	<b>3.09</b>	<b>-0.56</b>	<b>-0.24</b>	<b>-1.13</b>	-0.02
PEKAO	<b>YES</b>	<b>0.84</b>	-1.64	<b>-1.06</b>	0.02	0.54	<b>0.72</b>
BPH	<b>YES</b>	-1.47	-2.14	2.57	0.32	0.80	-0.25
All mergers		<b>0.43</b>	-0.91	0.29	0.07	0.28	<b>0.10</b>
<b>Acquisitions</b>							
BHW (acquiring)	<b>YES</b>	-0.70	-2.46	0.41	0.14	0.97	<b>0.41</b>
BRC (acquired)		-5.34	-3.99	14.91	0.54	4.25	<b>0.00</b>
BP (acquiring)	<b>YES</b>	-1.58	0.13	12.72	0.56	0.66	<b>0.04</b>
WBR (acquired)		-34.03	-5.66	96.94	0.01	5.76	-0.01
		-0.92	-2.41	1.37	0.16	1.02	<b>0.39</b>

<sup>1)</sup>Based on non-interest expense ratios.

Market power is calculated as the difference between the market power after and before the merger or acquisition. Calculations are based on the two years averages before and after the transaction, the year of the merger or acquisition is considered a transaction year, and therefore is skipped. Please, notice, that with the bold font, changes that are beneficial for the bank are indicated.

By analyzing cost ratios we aim to answer two questions. Have the acquiring banks been more efficient than the targets? Have they succeeded in extending their efficiency to the target banks? The first question receives an unambiguous positive answer. As we expected less efficient banks are prone to become targets. The results support the managerial inefficiency theory that views M&As as a corporate governance tool that is used to purge the system of inefficient institutions. Our empirical evidence is in line with the findings of Vennet (1996) and Avkiran (1999).

The profitability ratio most often followed by managers, shareholders, and other stakeholders of banks is *ROA*. As can be seen from Table 4.5, most analyzed mergers (five



out of seven) exhibit increased profitability, whereas none of the acquisitions have proved to be profitable. On average merged institutions have succeeded in improving their profitability by 0.43%. The increased profitability, however, does not seem to be the result of better cost efficiency, since the average costs of post-merger institutions have increased.

Only four merged entities were able to reduce their labor costs. There are a few plausible explanations for this. First, managers could be limited in their ability to lay off staff due to the rigid labor market regulation in Poland; second, in light of relatively low salaries, the problem might not seem very urgent (Financial System Stability Assessment (2001)). On the other hand, the ratio does not show the development of back vs. front office personnel. Theoretically, consolidation should reduce the amount of back office personnel. These reductions, however, could be offset by increases in the front office personnel, which could be a sign of better customer service or due to the opening of new outlets.

The increased costs of fixed assets in six out of nine institutions could be attributed to the upfront costs, such as long-term investments in IT. Indeed, banks' annual reports indicate that the mergers usually coincide with major changes in banking practices. For example, the IT systems of two pre-merger institutions are not just integrated, but in a few cases a completely new IT system was introduced. Whether these changes turn out to be profitable remains to be seen. As of now we can only state that recent M&As did not bring fast improvements to cost ratios.

Turning to risk analysis (*loan loss provisions/loans*), Table 4.5 shows that only three merged entities have experienced a positive effect on the quality of their loan portfolios. Thus, the restructuring process had rendered the banks more negligent in their risk management. There could be also other plausible explanations for the deterioration of the loan portfolio. First, the restructuring could have triggered a reevaluation of existing loans, and as a result the apparent poorer quality could be due to a different measurement. In fact, some banks have mentioned this in their annual reports. Second, increased loan loss provisions could be attributed to different portfolio structures. The market for loans to blue chip companies is fully saturated in Poland and, therefore, progressive banks should make attempts to tap retail, as well as small and medium business markets. Loans in such markets are riskier and require larger provisions, but, if correctly priced, this risk can pay off. Another risk related ratio, *earning assets/total assets*, demonstrates that only four banks have achieved better diversification and were able to decrease the amount of illiquid assets they were holding prior to the merger.

*Market power in terms of deposits* has increased after four transactions, two mergers and two acquisitions, which translates into an average 0.10 additional market power for merged banks and 0.39 for the banks participating in acquisitions. A closer examination reveals that higher cost efficiency does not enhance market power and, thus, is not necessarily transferred to depositors in terms of better returns or quality of service. In our case market power is associated with rising costs reflecting a more aggressive policy towards attracting new depositors.

### 4.5.3 Findings of the X-efficiency Investigation

There is a certain caveat in the calculations of CRORs presented above. For example, if the profit level was exceptionally high during the pre-merger period<sup>32</sup>, but did not return to this high level after a merger, such transaction would be deemed unsuccessful. Thus a bank would exhibit negative CRORs even in the case when it receives higher profits than most banks in the market. The Malmquist indices presented in Table 4.6 should circumvent this shortcoming.

Table 4.6. Summary of the Malmquist indices after consolidation

	Technical efficiency change	Technology change	Pure efficiency change	Scale efficiency change	Total factor productivity change
<b>Mergers</b>					
KB	<b>1.28</b>	0.97	<b>1.33</b>	0.96	<b>1.23</b>
BIG	<b>1.21</b>	0.93	1.00	<b>1.21</b>	<b>1.12</b>
BRE	0.68	<b>1.31</b>	<b>1.06</b>	0.64	0.89
PBK	<b>1.03</b>	0.95	1.00	<b>1.03</b>	0.97
BISE	<b>1.02</b>	<b>1.03</b>	<b>1.01</b>	1.00	<b>1.05</b>
PEKAO	0.96	0.71	1.00	0.96	0.69
BPH	0.88	<b>1.08</b>	1.00	0.88	0.95
All mergers	0.98	0.89	<b>1.03</b>	0.96	0.86
<b>Acquisitions</b>					
BHW (acquiring)	0.58	<b>1.47</b>	1.00	0.58	0.85
BRC (acquired)	0.43	<b>1.12</b>	0.68	0.63	0.49
BP (acquiring)	<b>1.01</b>	0.76	1.01	1.00	0.77
WBR (acquired)	0.90	0.93	1.00	0.90	0.84
All acquisitions	0.59	<b>1.44</b>	1.00	0.59	0.84

The intermediation banking model was assumed with three inputs (fixed assets, labor and purchased funds) and two outputs (loans, and Treasury bonds). Total productivity index is the product of technical efficiency and technology changes; technical efficiency change is the product of pure efficiency and scale efficiency changes. Each Malmquist index is the product of indices for the three years after consolidation. Please, notice, that with the bold font, changes that are beneficial for the bank are indicated.

The findings of the Malmquist indices presented in Table 4.6 show that the total factor productivity decreased on average by 14% and 16% after mergers and acquisitions,

<sup>32</sup> It is logical to assume that banks with exceptionally high profits will engage in M&A activity. In fact, in our sample acquiring banks were more profitable than the control group.

respectively. Four merged and one acquiring bank exhibit positive changes in technical efficiency, however, in some cases these improvements were offset by negative shifts in efficient frontiers, as is the case of PBK and BP.

Under the assumption of variable returns to scale, pure technical efficiency has increased by 3% after mergers and has remained constant after acquisitions. Variable returns to scale is the common assumption for the banking industry, because the efficiency of a bank is compared with its peers of the same size. However, we should note that Polish banking data is very thin for large banks. This could result in our labeling large banks efficient only because there would be no benchmark of similar size for comparison (Berg et al. (1993)). So we can only be confident when both specifications lead to the same conclusions.

#### **4.6. Conclusions**

The pace of mergers and acquisitions has been accelerating in Poland and there is every reason to believe that M&As will continue in the near future. In this paper we attempt to measure the consequences of this process to the participating banks and the public. We have primarily focused on nine M&As that have taken place between 1997-1999 by analyzing changes in profitability, risk, market power, and productivity. Additionally, we have investigated stock market reaction to the M&As that occurred between 1997-2001. Altogether we can draw the following conclusions.

First, the average reaction of the stock market to the seventeen M&A in the period of 1997-2001 has been positive. We observed that the market had anticipated announcements in all cases and therefore all abnormal returns had been realized already before the official announcement date. Our results are consistent with other studies that document that target banks experience particularly high abnormal returns.

Second, we can conclude that the level of integration of the consolidated institutions plays a pivotal role. Five out of seven mergers have improved their profitability either through cost cutting or improvements in total factor productivity (KB, BIG, BISE) or increased market power (BRE, PEKAO). The exceptions are PBK and BPH that do not exhibit any gains from consolidation. It is worth mentioning that the above banks merged together in 2001, and therefore the results could be influenced by the fact that the transformation was not fully completed, and they were still incurring upfront costs of the new technology and better trained personnel. In fact, financial ratios for the year following the merger show a positive trend.

When we direct our attention to the acquisitions, we note that the acquiring banks have concentrated on gaining larger market power, explaining their deteriorating profitability and cost ratios. The acquired banks have not only not improved their efficiency, but have even experienced deteriorating performance. This fact proves that a simple change of ownership and recapitalization without structural change is not enough to render a bank more efficient.

Additionally, it should be mentioned that in four out of nine cases profitable institutions (Kredyt Bank, PBK, BISE and Bank Pocztowy) have taken over distressed banks. Kredyt Bank and BISE have succeeded in incorporating the target banks and have become even more efficient institutions. PBK has not completely recovered from the merger, but ended each subsequent year with positive returns. Only the Bank Pocztowy, even after infusing new capital into the acquired bank, has not managed to enhance its efficiency<sup>33</sup>. Thus, the consolidation process in the above three out of four cases has helped to purge the banking system of inefficient institutions.

Third, the consequences of consolidation to the public are mixed. On the one hand, the gains of the increased efficiency were not passed to depositors in terms of better customer service or higher interest rates. On the other hand, consolidation has helped to purge the banking market of distressed institutions. The fact that this has been done mainly through consolidation, rather than liquidation, is beneficial to the public for two reasons. First, public money has not been spent in the liquidation process, and second, the trust of the depositors has not been put to test.

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<sup>33</sup> One year later it withdrew its investments and Wielkopolski Bank Rolniczy SA was put by the Commission for Banking Supervision under administration.

## **Chapter 5: Does the Bank Lending Channel Work in a Transition Economy? The Case of Poland**

### **5.1. Introduction**

The level of financial market's development has a significant bearing on the transmission of monetary policy. When some companies do not have alternative sources of finance, bank credit becomes special. Thus, a reduction in bank financing due to the contraction of monetary policy might have an adverse effect on bank-dependent companies, which is unforeseen by the traditional money view of the monetary policy transmission. Bernanke and Blinder (1988), who were the first ones to model what is now known as the bank lending channel, pointed that the monetary policy can change not only the demand for bank loans, as prescribed by the money view, but the supply as well.

The start of the European Monetary Union has brought a renewed interest in the subject, because the existence of a bank lending channel is one of the reasons why a reaction to a single monetary policy can vary from country to country. The existing evidence for the European Union concludes in favor of the bank lending channel hypothesis. The factors that determine the heterogeneous supply of banking loans, however, depend on local circumstances. After Poland's accession to the EU in May, 2004, the adoption of Euro and single monetary policy becomes the next step in European integration. Therefore, it is of great interest to investigate the role of banks in the transmission of monetary policy in Poland. And although it is plausible to assume that the accession of Poland to the EMU will significantly influence this transmission process (as the acclaimed Lucas critique predicts), changes in the financial structure are likely to occur only gradually. Therefore, current findings might serve as a good indicator of the future response of bank lending to changes in the ECB's monetary policy stance.

Being a transition economy, Poland presents a very interesting case of a bank lending channel. On the one hand, a demand for banking services has been very high in the last decade due to the catch-up effect and resulted in high growth rates of banking assets. For instance, bank loans have grown from 21% of GDP in 1996 to 28.8% in 2001, almost a 37% increase in 6 years. As it has been voiced in the literature (see e.g. Wagner and Iakova (2001)) in such circumstances the demand for bank loans could be insensitive to the changes in interest rates, rendering the traditional interest rate channel of the monetary policy inoperative. On the other hand, due to some specific characteristics of the Polish banking system, it is plausible to expect heterogeneous reactions of banks to monetary policy

tightening which might not fall in line with the predictions of the bank lending channel hypothesis.

Banks dominate the Polish financial market, constituting 84.9% of all financial assets in 2001. Due to the underdeveloped capital market, market finance is unavailable to majority of companies. Other sources of external funds in case of reduced borrowing from banks are cross-border lending and inter-company loans. They are, however, available only to blue chip companies and companies with foreign direct investments, respectively. Thus, there are all reasons to believe that small and medium enterprises (SME) could be hit disproportionately hard during the tightening of monetary policy.

In the paper we investigate the effect of monetary policy shocks on the bank lending in Poland between 1997 and 2002. Following recent literature, in order to test for the existence of the bank lending channel, we assume that banks' reactions to changes in the monetary policy stance depend on their characteristics, namely size, liquidity and capitalization. We also investigate whether the ownership structure has a bearing on the banks' credit supply decisions.

The remainder of the paper is structured in the following way. In Section 5.2 we explain the theoretical underpinnings of the bank lending channel and shortly describe the main empirical findings from the United States and the European Union. In Section 5.3 we analyze the financial indicators that could aid us in better understanding of the monetary policy transmission in Poland. In Section 5.4 we propose a model that we want to estimate and justify our choice of the estimation methodology. Sections 5.5 and 5.6 present the data and the results of our estimation. Finally, Section 5.7 contains some concluding remarks.

## **5.2. The theoretical and empirical justification of the bank lending channel**

In the traditional IS-LM framework, monetary policy impulses influence only the supply of money, leaving IS curve unchanged. A bank is modeled as an institution that holds demand deposits on the liabilities side and reserves and bonds on the assets side. When, for example, central bank decides to drain reserves from the banking system, the competition for bank reserves on the interbank market rises, stepping up short term interest rates in the economy. This induces households to reevaluate their portfolio decisions and reallocate more money from demand deposits into interest bearing bonds. If the Modigliani-Miller (M-M) theorem holds (meaning that bond and loans are perfect substitutes), firms are not affected by decreasing supply of loans, because they can easily turn to the market form of finance. The contraction or expansion of bank loans in the IS-LM framework is explained only through

changes in demand for loans due to interest rates. Such channel of monetary transmission is usually called “interest rate channel” or “money view”.

When M-M proposition does not hold, bank loans become “special” for certain companies that have limited access to capital markets. The failure of the M-M proposition is the central idea of the bank lending channel. After the outflow of deposits banks, in order to shield their loan portfolios, have to attract additional non-reservable liabilities. If they fail to do so, the supply of loans could decrease, thus augmenting the effect of the interest rate channel. Within the IS-LM framework this would lead to the shift of the IS curve (called by Bernanke and Blinder (1988) commodities and credit curve). Under this scenario, the monetary policy would affect disproportionately small companies - they would be faced with difficulties substituting bank loans.

It has been argued that the effect of a bank lending channel in the real world could be muted. First, many demand deposits pay interest rates that fluctuate along other market rates. Thus, the outflow of deposits could be prevented by an increase in interest rates. In practice, however, it was observed that there has always been a lag between the hike in the interbank rates and deposit rates. Second, the reserve requirements in many countries have been very low, limiting the strength of monetary intervention. Moreover, the effective deposit insurance in most countries makes the withdrawal of funds even more unlikely as even small banks are viewed as credible by potential depositors.

During the last decade researchers have made many attempts to test the existence of bank lending channel. Kashyap et al. (1993) found that during tightening of monetary policy the amount of bank loans decreases whereas the issuance of commercial paper surges. This could be an indication of the inward shift in the supply of bank loans. Alternatively, however, this could be explained by the increased demand for commercial paper among large companies, which are less affected by business cycles, whereas demand of small companies for bank loans falls.

The above example illustrates the identification problem that exists in the literature on the bank lending channel. The aggregated banking data has not proved to be helpful in distinguishing between the demand and supply schedules of banks, thus most of the recent studies were performed using individual bank data. Initially the quest for the bank lending channel was carried out on the data for the US economy. The underlying idea was that adjustment of the banks’ credit supply might depend on their different characteristics. Thus, banks that are subject to adverse selection problems might have more difficulties to find substitutes for deposits after the contraction of monetary policy. In the literature a common

proxy for the informational asymmetries are size and capitalization of a bank. Kashyap and Stein (1995) found that small banks react disproportionately strong to changes in the monetary policy stance. Peek and Rosengren (1995) and Kishan and Opiela (2000) investigated the effect of capital and shown that undercapitalized banks are more prone to curtail their lending during monetary contraction. Liquidity of a bank was also considered an important characteristic – during monetary contraction, banks faced with a decline in deposits might draw down their liquid assets to in order shield the credit portfolios. Kashyap and Stein (2000) shown that the contractionary monetary policy hit especially hard small and underliquid banks.

One more factor that may have a significant bearing on the response of banks to changes is monetary policy is the ownership structure. As voiced by de Haas and van Lelyveld (2003) foreign banks are usually a part of large bank company, therefore their lending decisions are not entirely autonomous. This might, on the one hand, translate to a more stable supply of loans, even during crisis periods, as the parent banks may act as ‘back-up’ facilities for their subsidiaries. On the other hand, however, foreign banks may react procyclically to changes in the host markets, the intuition being that during the economic slow-down the parent bank may decide to reallocate available funds form a domestic market to more profitable regions.

After the start of the common monetary policy in the Euro Area, the interest in the bank lending channel has rekindled. Since bank lending channel depends on the level of financial system’s development, its existence would imply that the strength of reaction to monetary policy would vary from country to country. So far the empirical evidence for the Euro area is inconclusive. Altunbas et al. (2002) have found that banks with lower level of capitalization are more affected by the monetary policy. The results of another study on the Euro area suggest that liquidity is important (Ehrmann et al. (2003)). A number of individual country studies reach conclusion that, albeit results differ from country to country, size, liquidity and capitalization are important in explaining different responses in loan supply. Only the study on Spain by Hernando and Martinez-Pages (2003) has concluded against the existence of the bank lending channel.

### **5.3. The financial system in Poland**

In order for the bank lending channel to work some important preconditions should be met. First, banks should not be able to shield their loan portfolio in case of monetary policy tightening. Moreover, the degree of adjustment of the banks’ loan supply to changes in the



monetary policy stance should be heterogeneous, depending on various bank characteristics. Second, the National Bank of Poland should be capable of influencing the amount of loanable funds in the banking system. Last but not least, there should be companies not able to find alternative sources of funds in case bank lending is disrupted. We will investigate these prerequisites in the subsequent paragraphs.

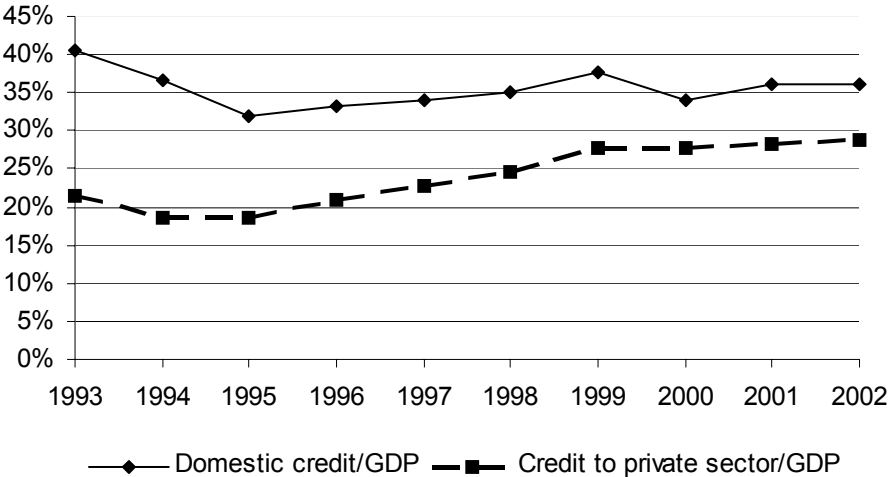
Table 5.1. Key Indicators for the Polish Financial System for the Years 1996-2002

	1996	1997	1998	1999	2000	2001	2002
<b>Structure of the Polish banking system</b>							
Number of commercial banks <sup>1)</sup>	81	83	83	77	74	71	64
Number of banks with majority public sector ownership	24	15	13	7	7	7	7
Number of foreign-owned banks	25	29	31	39	47	48	47
Ratio of assets of foreign-owned bank to total assets of the banking sector	13.7	15.3	16.6	47.2	69.5	69.2	67.2
Share of banking assets in total assets of the financial sector	94.5	93.4	92.4	90.3	87.4	84.9	n.a.
<b>Herfindahl Indicator</b>							
for assets	0.08	0.08	0.08	0.08	0.08	0.09	0.08
for deposits	0.11	0.12	0.13	0.12	0.12	0.12	0.11
for loans	0.06	0.06	0.06	0.07	0.08	0.09	0.07
<b>CR5</b>							
for assets	48.8	46.2	42.9	47.7	46.5	54.7	53,6
for deposits	52.3	51.9	51	55.4	54.7	59.8	60,4
for loans	43.8	41.4	35.7	46.1	46.1	47.9	51,2
<b>Financial depth indicators (in percent of GDP)</b>							
Bank assets	50.9	52.4	57.6	59.1	60.1	62.6	60.6
Credit to the private sector	21.0	22.7	24.5	27.6	27.7	28.3	28.8
Deposits	56.6	58.3	58.8	60.8	59.3	61.1	59.6
<b>Major characteristics of the stock market</b>							
Market capitalization (in % to GDP)	6,2	9	8,9	7,6	19,9	13,9	14,3
Number of new listings of bond issues (of which private)	19(0)	26(0)	16(0)	19(0)	13(1)	13(0)	19(3)
Number of companies newly listed (main and parallel market)	18	62	57	28	13	9	5
Number of companies delisted	1	16	2	5	9	4	19
Newly raised capital (in % of Gross Fixed Capital Formation)	-	2.9	2.9	2	3.3	0.014	0.01
<b>Banking sector financial stability indicators</b>							
Solvency ratio	12.3	12.5	11.7	13.2	12.9	15.1	13.7
Irregular claims to total claims (%)	13.2	10.5	10.9	13.7	15.5	18.6	20
Net interest margin (%)	5.98	5.23	4.58	4.01	4.26	3.38	3.12
ROA (%)	3.77	3.00	1.75	1.60	1.51	1.36	0.85
ROE (%)	100.1	67.5	28.4	23.1	21.7	18.5	9.90
<b>Additional sources of funds for companies (in % to GDP)</b>							
Inter-company loans	1.99	3.22	3.94	4.76	5.35	5.58	5.43
Cross-border lending	2.6	3.15	4.93	6.57	7.19	7.85	7.72
Commercial paper		0.54	1.01	1.08	1.60	1.76	1.51
Corporate bonds		0.12	0.25	0.30	0.36	0.42	0.79

Source: NBP, IMF, CERA and FIBV statistics, and author's own calculations.

First, let us look at the situation in the banking sector in Poland. As can be seen in Table 5.1, Polish financial system is clearly bank-dominated, with the ratio of bank assets to total financial assets constituting 90% on average. Such high ratio, however, should be interpreted as a sign of a relative underdevelopment of other financial markets in Poland rather than the sign of bank credit availability. Ratio of domestic credit to GDP (Figure 5.2), a popular measure of the bank intermediation depth, although slowly rising between 1995-1999, has stabilized around 36% in the recent years – a very low level even when compared with other Central and Eastern European Countries, not to mention the Euro zone. Another widely used indicator, the ratio of bank credit directed to private sector, seems to increase slowly, but it, as mentioned by Riess et al. (2002), it might be more the effect of privatization of state-owned companies than the true sign of bigger involvement of banks in the financing of domestic economy.

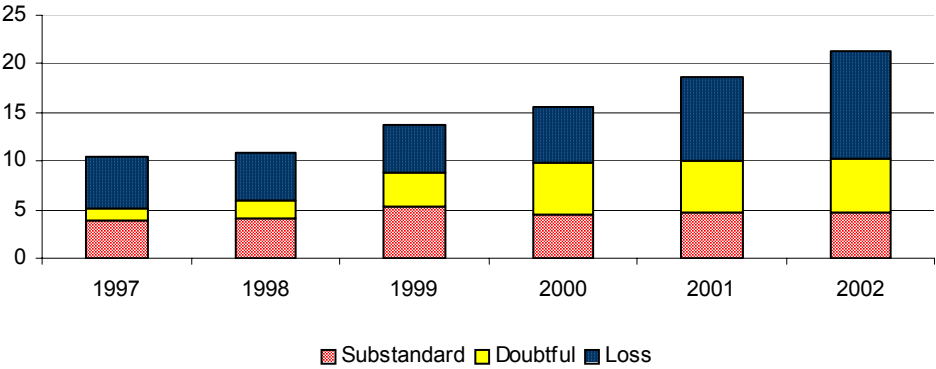
Figure 5.1. Ratio of Domestic Credit and Credit to the Private Sector to GDP



Source: NBP

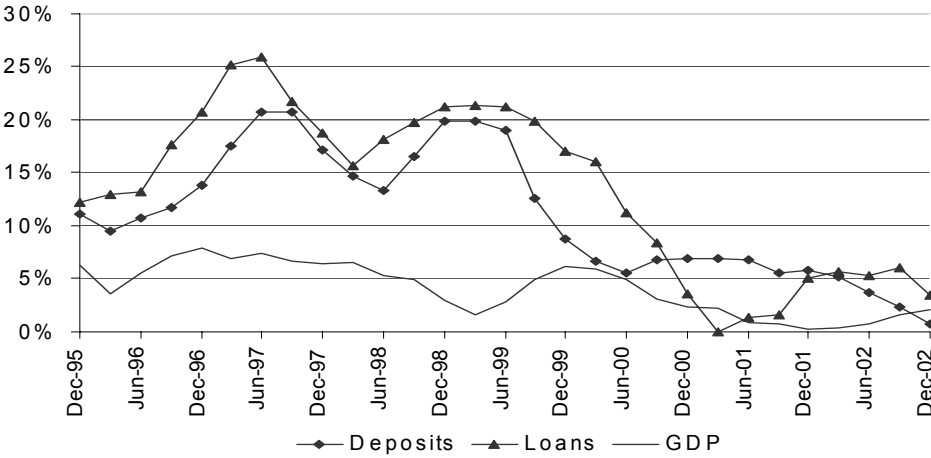
What are the reasons for such a low level of financial intermediation? Riess et al. (2002) enumerate, inter alia, lack of profitable investment opportunities, insufficient skills of bank’s employees in assessing, pricing and managing risk, insufficient protection of creditor rights and inefficient bankruptcy procedures. Moreover, a slow down in economic growth at the end of 90s has caused a significant worsening of the loan portfolio quality (Figure 5.2), contributing, together with the factors mentioned before, to the slow-down in the credit growth in the recent years (Figure 5.3).

Figure 5.2. Ratio of Irregular Claims to Gross Claims on Non-Financial Customers of Commercial Banks



Source: NBP

Figure 5.3. The Real Annual Growth Rates of GDP, Loans, and Deposits



Source: IFS

Not all Polish banks reacted in the same way to the worsening economic conditions. Table 5.2 presents key bank characteristics calculated separately for small and big banks. The most conspicuous fact is the difference in composition of assets between small and large banks. Small banks seem to serve as liquidity providers for the economy, with over 60% of assets allocated into loans and only 9% to securities. The reverse is true for large banks, where securities account for 26% of total assets and loans for 44%. This fact becomes much less astonishing when we look at the recent reports of the National Bank of Poland, showing

that the ratio of irregular claims (picturing the bank's portfolio quality), while relatively stable for small banks, has been rising fast for the large banks (NBP 2003). It is, therefore, understandable that large banks, while trying to improve their asset portfolio, cut lending and invest funds into the Treasury Bonds. Moreover, due to the rapidly increasing inflation, such investment became very profitable, yielding higher effective returns in 2002 than loans (NBP 2003). Many small banks, on the other hand, lead in recent years aggressive advertising campaigns, trying to increase their share in both loan and deposit market.

Table 5.2. Summary Statistics of the Whole Sample (Commercial and Cooperative Banks) between 1997-2002

	Small banks	Large banks
Number of banks	30	9
Average Total Assets (in mln PLN)	160.60	43696.19
<b>Assets (average in mln PLN)</b>		
Loans	98.50	18308.97
Interbank assets	31.22	6615.18
Securities	14.94	12621.03
<b>Assets (as a ratio of total assets)</b>		
Loans	60.27%	43.60%
Interbank assets	20.33%	16.05%
Securities	9.04%	25.94%
<b>Liabilities (average in mln PLN)</b>		
Deposits	112.73	30848.52
Capital and reserves	20.58	3484.60
<b>Liabilities (as a ratio of total assets)</b>		
Deposits	71.07%	66.61%
Capital and reserves	13.34%	8.97%

Small banks are defined as those located below 25 percentile, or having total assets less than 313.4 mil. PLN. Large banks are located above 90 percentile, thus their total assets are more than 22376.9 mil. PLN.

As mentioned above, also the ownership structure might have a significant bearing on the reaction of banks' credit supply to changes in the monetary policy stance. Due to the privatization process, number of foreign-owned banks has almost doubled since 1996 and in 2002 67% of total bank assets were controlled by foreign banks (Table 5.1). This foreign banks' dominance, combined with the gradual liberalization of the Polish capital account let us presume that there might be differences in the credit supply adjustment between foreign and domestic banks.

Let us turn now to the second precondition for the existence of a bank lending channel, namely to the impact that the monetary authority is able to exert on the amount of

loanable funds. For a moment let us assume that NBP does have control over deposits. Then, in case of monetary tightening, banks are expected to turn to other sources of funds, such as bonds and certificates of deposits (CD). As it can be seen in Table 5.1, bond market is in its cradle development in Poland, constituting 0.21% of GDP in 2001. Moreover, banks are not interested in the issue of CDs for two reasons. First, CDs sold to non-bank institutions are subject to the reserve requirements. The only issuers of this type of investment are banks that specialize in car loans, such as Volkswagen Bank Poland SA, Fiat SA and GMAC SA, because they do not have branches and cannot collect regular deposits. Due to limited amount of issues, the secondary market for CD is virtually non-existent. Second, since 1995 Polish banking system is overliquid<sup>34</sup> and the National Bank of Poland remains net borrower of the banking system.

Effective deposit insurance<sup>35</sup> and a small number of bank liquidations in the past ensured that even small banks are not viewed as risky by depositors. Thus, it is unlikely that during monetary contraction deposits would fall by any significant amount due to security concerns on the side of depositors. Moreover, there are numerous examples of the Polish National Bank attempting to apply restrictive monetary policy by raising reserve requirements and increasing discount rate to no avail. In order to pull deposits out of the banking system, between September and December 1997 the Polish National Bank was even offering time deposits at the rates competitive with those of commercial banks. It is plausible to expect, therefore that a change in interest rates decided upon by the National Bank of Poland will have only a meager (if any) effect on the amount of loanable funds available in the banking system.

Last but not least, we check if the third condition is met, namely if non-bank finance is available for companies. As mentioned above, bank assets dominate the Polish financial system. Even though the Warsaw Stock Exchange is the leading stock exchange in the region in terms of both market capitalization and a number of listed companies, it still contributes little to the sources of corporate finance – in 2002 newly raised capital amounted to meager 0.1 % of Gross Fixed Capital Formation. Due to high costs of public issue between 1996-2002 only four company issued bonds on the stock exchange. Although commercial paper and

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<sup>34</sup> In 1995, banks, expecting the appreciation on Polish zloty, started rapidly selling their foreign currency holdings.

<sup>35</sup> The Deposit Insurance cover provided by the Bank Guarantee Fund has been rising from the zloty equivalent of 4000 Euro in 1997, to 5000 in 1998, 8000 in 1999, 11000 in 2000, 15000 in 2001, 17000 in 2002, and finally to 20000 in 2003, being now in compliance with the EU Deposit Guarantee Schemes Directive (94/19/EC). However the competition between banks was uneven till 1999, when three state banks (PKO PB, PEKAO SA, BGZ SA) enjoyed full deposit guarantee.

corporate bond market outside of the stock exchange has been developing rapidly, its significance is, however, marginal, because the issues are distributed among less than 300 investors<sup>36</sup> and the secondary market is illiquid. Notwithstanding the fact that some selected companies rely on the cross-border lending (7.72% of GDP in 2002) or inter-company loans from foreign direct investors (5.43% of GDP in 2002), most of the external financing of the companies is limited to bank credit. Small and medium enterprises have limited access to the credit, but the situation is changing slowly. Only recently, as the credit-market for the blue-chip companies is exhausted, banks start tapping new market segments.

## 5.4. The Model and Estimation Methodology

### 5.4.1. The Model

In order to analyze bank lending channel we use the approach of Kashyap and Stein (1995), which helps to omit an important caveat, namely that the fall in loan growth is a result in a demand phenomenon. The main idea is that if we control for demand factors, changes in the credit's supply can be ascribed to the supply factors only. If differences in credit supply are a function of the aforementioned bank characteristics, we can conclude in favor of the bank lending channel.

For the purpose of empirical estimation we use the model of Ehrmann et al. (2001), which follows the generalized Bernanke and Blinder (1988) IS-LM model re-written in first differences:

$$\begin{aligned} \Delta \log B_{it} = & \alpha_i + \sum_{j=1}^i \beta_j \Delta \log L_{i,t-j} + \sum_{j=0}^i \chi_j \Delta \log GDP_{t-j} + \sum_{j=0}^i \gamma \text{inf}_{t-j} \\ & + \sum_{j=0}^i \Delta i_{t-j} + \phi x_{t-1} + \sum_{j=0}^i \varphi \Delta i_{t-j} x_{it-1} + \varepsilon_{it}, \end{aligned} \quad (5.1)$$

In the model  $\alpha_i$  denotes a bank-specific intercept,  $\Delta \log B_{it}$  - the growth rate of loans or deposits in period  $t$ ,  $\Delta \log GDP_t$  - growth rate of real GDP,  $\text{inf}_t$  - inflation rate in quarter  $t$ ,  $\Delta i_t$  - first difference of the Polish money market rate,  $x_t$  - a bank characteristic (meaning size, liquidity, capitalization and ownership),  $\Delta i_{t-j} x_{it-1}$  interaction between change in monetary market interest rate and bank characteristic,  $i=1, \dots, N$  denotes the bank, and  $t=1, \dots, i$  the number of lags.

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<sup>36</sup> According to Article 2 of the Law on Public Trading, if the offer is addressed to more than 300 investors it is considered public and must be approved by the Securities and Exchange Commission.

The underlying idea behind such specification is that banks are affected by the monetary policy differently, depending on the degree of informational asymmetries, proxied by their different characteristics. The size of a bank ( $S_i$ ), is measured by the amount of bank's total assets. The best proxy for the banks' capitalization ( $C_i$ ), namely the Basel capital ratio was unavailable to us, therefore we used the ratio of capital and reserves to total assets. Liquidity of the bank, ( $L_i$ ), was computed by dividing liquid assets (the sum of interbank assets and securities) by total assets. If the banks react heterogeneously to changes in the monetary policy stance, the interaction coefficients of bank characteristics with changes in the short-term interest rates should be positive, the intuition being that small, underliquid and undercapitalized banks are hit disproportionately hard. To avoid endogeneity problem, first lags of  $S$ ,  $L$  and  $C$  characteristics are used instead of their current values.

To be able to interpret interaction variables directly as the impact of change in the money market interest rate on the growth rate of loans, the bank characteristics have been normalized. *Size* was normalized with respect to each period's mean, as such procedure removed also the upward trend, which could be observed in banks' assets. *Liquidity* and *Capitalization* were normalized with respect to overall sample mean.

As we also wanted to investigate whether the ownership has a bearing on the supply of bank loans, we constructed two foreign ownership dummies: *Greenfield<sub>t</sub>* and *Takeover<sub>t</sub>*. The first dummy takes the value of one if a foreign bank was newly founded in Poland and zero otherwise and the second if the existing Polish bank was bought by a foreign investor and zero otherwise. Whether foreign banks react counter- or procyclically to both Polish and their home country's economic conditions remains to be determined by our empirical work.

#### 5.4.2. Estimation Methodology

The model of bank lending presented above is characterized by the presence of lagged values of the dependent variable among regressors. It immediately follows that our right-hand regressors are correlated with the error term. Such type of a dynamic panel data model renders the estimation with the OLS, fixed or random effects biased and inconsistent. Thus, we use Generalized Method of Moments (GMM)<sup>37</sup>, proposed by Arellano and Bond (1991).

Arellano and Bond (1991) suggested to difference the original equation in order to discard individual effects and offered a set of instruments that should help to obtain unbiased and consistent estimators. For the endogenous variables we used their second to fifth lags as

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<sup>37</sup> Estimation was performed using the DPD program written in Ox. For further information about the program see Doornik et al. (2002).

instruments. Macroeconomic variables were assumed to be strictly exogenous and uncorrelated with individual effects; therefore we used their first differences as instruments. Since in the small sample second step estimates are likely to be biased, the first step results are presented.

To check whether the instruments were chosen properly and the assumptions underlying the model hold, a few tests were proposed (Arellano and Bond (1991)). Consistency of our estimators relies on the fact that the disturbances follow MA (1) process and there is no second order autocorrelation of disturbances. Hence, we use AR(1) and AR(2) tests to check the null hypothesis of zero autocorrelation of order one and two, respectively. Further, we check the validity of the employed instruments with the Sargan test.

### **5.5. Data**

Our banking data set was obtained from the quarterly balance sheets of Polish banks and originally featured 109 institutions. It contained information on all commercial banks and a few biggest cooperative banks<sup>38</sup> and covered the period between Q1-1997 and Q4-2002, encompassing 89-97% of the total banking assets (depending on the year).

There are different approaches to the measurement of the monetary policy stance. We have opted for the change in the short-term money market rate, which is the most commonly used indicator in the bank lending literature (see for e.g. Kishan and Opiela (2000), Kashyap and Stein (2000), Altunbas et al. (2002)). As an indicator of foreign monetary policy interest rates of foreign banks' home countries were used. Real GDP growth and inflation rates for Poland and home countries were taken from the IFS.

During the analyzed period a consolidation process has transformed Polish banking system<sup>39</sup>. To account for the merger activity, there are two most commonly used methods in the literature, namely (1) backward aggregation of balance sheets of the merged bank entities or (2) leaving the data unaggregated but skipping the year of the merger (see for e.g. Ehrmann et al. (2003)). We have opted for the second solutions, because many mergers involved greenfield banks, whose data would be lost due to aggregation. We wanted to avoid this, because we expected them to behave differently from either domestic or takeover banks. Additionally, recognizing the fact that mergers, acquisitions, start-ups and closures of banks

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<sup>38</sup> Cooperative banks are very numerous in Poland, but their total assets do not exceed 5% of the total banking assets. Thus, exclusion of the majority of cooperative banks from our dataset does not affect the representation quality of our sample.

<sup>39</sup> During 1994-2002 at least 20 mergers involving 45 commercial banks have taken place. Cooperative banks have engaged in the cooperative activity even more readily but, unfortunately, we have no reliable information on the details of it.



might result in “irregular” growth rates, we have dropped banks with growth rates of loans and deposits below 1<sup>st</sup> and above 99<sup>th</sup> percentile. Consequently, we were left with the unbalanced panel of 67 banks that provided us with 1027 quarterly observations.

When quarterly data is used, the seasonality problem might arise. Therefore, we have tested for the identifiable seasonality by combining F-tests for stable and moving seasonality along with the Kruskal-Wallis test for stable seasonality<sup>40</sup>. The above tests allowed us to perform one-way and two-way analysis of the variance in order to detect any significant variation that is due to quarters or years, which in turn is the evidence of the seasonality. We could not reject the null hypothesis of no seasonality, and thus applied no seasonal adjustment to our data.

## **5.6. Empirical Findings**

### **5.6.1. The Model with *Size, Liquidity and Capitalization***

The results obtained from the empirical estimation of the model are summarized in Table 5.3<sup>41</sup>. The effect of each variable is presented first as the sum of lags, which gives us its direct impact on the growth rate of loans. Below, the long-run coefficients are reported together with specification tests. The table presents the results of four specifications. First, we use only one bank characteristic (namely size, liquidity and capitalization) at a time. As these variables are likely to be interdependent, using only one might result in an omitted variable bias. Therefore in the fourth column we present the findings when all banks characteristics are included.

First of all, we see that all macroeconomic variables are statistically significant and carry an appropriate sign. Loan growth increases with the economic activity, which is in line with the real business cycle hypothesis. Inflation also has a positive impact because the nominal value of new loans is higher under higher price level. As expected, monetary policy has a negative impact on bank lending of an average bank in the sample, suggesting that demand for loans falls when real interest rates are raised. However, the magnitude of this impact is smaller than the effect found in the EU (see e.g. Ehrmann et al. (2001)), which is not surprising because of the catching up effect already mentioned above.

In order to control for different bank characteristics that might have an effect on loan growth we include size, liquidity and capitalization variables. Our findings indicate that small,

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<sup>40</sup> The seasonality tests were performed as the part of the X-11 seasonal adjustment program provided by the SAS software.

<sup>41</sup> Table 3 presents the summaries of the estimation results. Complete tables with all coefficients of the models are available from the authors upon request.

liquid and well-capitalized banks enjoy higher loan growth rate. However, only the coefficient for liquidity and capitalization are significant.

Positive and significant coefficients of the interaction variables would indicate that due to asymmetric information problems small, illiquid and undercapitalized banks adjust their credit supply to changes in the short-term interest rates to a larger degree than large, liquid and well-capitalized ones. In our case all interaction coefficients, albeit positive, are not significant. This finding suggests that we do not find bank lending channel of the monetary policy transmission in Poland.

Table 5.3. Estimation Results for the Ehrmann Model

	Size		Liquidity		Capitalization		All variables	
	coeff	s.e.	coeff	s.e.	coeff	s.e.	coeff	s.e.
<b>Direct coefficients</b>								
GDP	1.3169	0.3176***	1.2830	0.3313***	1.2593	0.3335***	1.1797	0.3042***
Inflation	3.3264	1.1267***	3.7118	1.1032***	3.4661	1.2105***	3.1481	1.1455**
MP	-0.0420	0.0077***	-0.0408	0.0086***	-0.0398	0.0084***	-0.0368	0.0075***
Size	-0.0634	0.0382	-0.0195	0.0483	-0.0605	0.0425	-0.0371	0.0336
Capital	0.5211	0.2424**	0.7170	0.2528***	0.5616	0.2431**	0.5051	0.1975**
Liquidity	0.1745	0.104*	0.1279	0.1083	0.2400	0.1203**	0.1587	0.0829**
MP*Size	0.0007	0.0014					0.0006	0.0014
MP*Liquidity			0.0021	0.0266			0.0079	0.0253
MP*Capital					0.0255	0.0591	0.0075	0.0525
<b>Long-term coefficients</b>								
GDP	0.8960	0.2429***	0.9567	0.2765***	0.8985	0.2859***	0.8869	0.2587***
Inflation	2.2631	0.8463***	2.7679	0.8713***	2.4730	0.9462**	2.3669	0.9214**
MP	-0.0286	0.0064***	-0.0304	0.0075***	-0.0284	0.0075***	-0.0277	0.0066***
Size	-0.0431	0.0255*	-0.0145	0.0358	-0.0431	0.0286	-0.0279	0.0248
Capital	0.3545	0.1734**	0.5346	0.2043**	0.4007	0.1938**	0.3797	0.1622**
Liquidity	0.1187	0.0767	0.0954	0.084	0.1712	0.0983**	0.1194	0.0668*
MP*Size	0.0004	0.0009					0.0005	0.0011
MP*Liquidity			0.0016	0.0198			0.0060	0.0188
MP*Capital					0.0182	0.0431	0.0056	0.0395
No of obs	1064		1064		1064		1064	
Wald test	106.1	[0.000]***	71.08	[0.000]***	98.13	[0.000]***	87.09	[0.000]***
Sargan test	68.52	[1.000]	62.79	[1.000]	67.80	[1.000]	61.54	[1.000]
AR(1)	-3.22	[0.001]***	-3.58	[0.000]***	-2.59	[0.010]***	-3.38	[0.001]***
AR(2)	1.155	[0.248]	1.332	[0.183]	0.513	[0.608]	1.154	[0.248]

When compared with similar finding for the EU we observe that during monetary contraction (expansion) Polish banks decrease (increase) their lending by far less than their counterparts in the current EMU member states. This means that Polish economy requires much larger interest rates increases in order to keep it from overheating, and much larger interest rates reductions in order to stimulate it during a downturn than the economies of the current EMU member states.

### **5.6.2. Impact of Foreign Ownership**

As mentioned above, high foreign participation in the banking sector allows us to presume that foreign and domestic banks might react differently to changes in the Polish monetary policy. Moreover, foreign banks might also determine their lending decision based on the economic development and monetary policy stance in their home countries. To investigate this hypothesis, we introduce (1) foreign ownership dummies, (2) indicators for the economic growth and monetary policy stance of the foreign banks' home countries, and (3) movements of the exchange rate. The results are presented in Table 5.4.

In the first model we include greenfield and takeover dummies both on their own and interacted with monetary policy indicators. The inclusion of these new variable has little impact on the level and significance of the macroeconomic coefficients, namely GDP growth, inflation and change in monetary policy. However, the significance of bank characteristics changes and in the new model small, and liquid banks expand their loan portfolios faster (in the previous models it was liquid and well-capitalized banks). Capital becomes less important, which could be explained by the fact that foreign banks, particularly greenfield ones, are much better capitalized than either domestic or foreign banks that had taken over previously domestic banks. Surprisingly, we do not find that greenfield banks continue to expand during the tight domestic monetary policy.

Our next step is to include home country economic growth and monetary policy stance for foreign banks. Their interaction variables with greenfield dummies prove to be significant, indicating that greenfield banks are sensitive to economic conditions in their home countries and expand lending in Poland during monetary contraction at home, and depreciation of zloty. This has two consequences for the monetary policy transmission in Poland. First of all, the effect of expansionary (tightening) domestic monetary policy can be weakened when there is an expansionary (tightening) monetary policy abroad, and therefore the economic conditions in home countries of foreign banks should be taken into account when designing monetary policy. However, if Poland were a member of the EMU, the impact of European Central Bank policy would disappear, even though monetary policy of the US should still be taken in the account.

Following Schmitz (2004), we include movements in the real effective exchange rate (REER) in our third model. We expect that the appreciation of zloty could lead to capital inflows which would translate into increased bank lending. Our results confirm our expectations; all banks increase their lending as REER appreciate. Moreover, the significance

of interaction variable indicates that greenfield banks increase their lending faster than other banks.

Table 5.4. Estimation Results for the Model with Foreign Ownership Characteristics

	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	
<b>Direct coefficients</b>							
		0.35 <sup>***</sup>					
GDP	1.10		1.08	0.34 <sup>***</sup>	0.92	0.35 <sup>***</sup>	
Inflation	0.98	0.46 <sup>**</sup>		1.01	0.37 <sup>***</sup>	1.03	0.39 <sup>***</sup>
MP	-0.04	0.01 <sup>***</sup>		-0.04	0.01 <sup>***</sup>	-0.04	0.01 <sup>***</sup>
Home MP	0.04	0.02 <sup>**</sup>		0.00	0.02	0.01	0.01
Home GDP	0.53	0.27 <sup>*</sup>		0.55	0.58	0.63	0.46
REER	0.53	0.24 <sup>**</sup>		0.32	0.10 <sup>***</sup>	0.32	0.10 <sup>***</sup>
Size	-0.12	0.03 <sup>***</sup>		-0.11	0.03 <sup>***</sup>	-0.14	0.03 <sup>***</sup>
Capital	0.34	0.20 <sup>*</sup>		0.33	0.19 <sup>*</sup>	0.26	0.21
Liquidity	0.17	0.09 <sup>*</sup>		0.16	0.08 <sup>**</sup>	0.20	0.08 <sup>**</sup>
Greenfield	0.00	0.00		0.00	0.00	0.00	0.00 <sup>***</sup>
Takeover	-0.03	0.05		-0.02	0.05	-0.06	0.05
MP*Greenfield	-0.01	0.01 <sup>*</sup>					
MP*Takeover	-0.01	0.01					
Home MP_Greenfield				0.03	0.02 <sup>*</sup>		
Home MP_Takeover				-0.01	0.02		
REER_Greenfield						0.27	0.11 <sup>**</sup>
REER_Takeover						-0.03	0.29
<b>Long term coefficients</b>							
GDP	0.83	0.27 <sup>***</sup>		0.83	0.28 <sup>***</sup>	0.75	0.29 <sup>**</sup>
Inflation	0.74	0.37 <sup>**</sup>		0.78	0.31 <sup>**</sup>	0.84	0.35 <sup>**</sup>
MP	-0.03	0.01 <sup>***</sup>		-0.03	0.01 <sup>***</sup>	-0.03	0.01 <sup>***</sup>
Home MP	0.03	0.01 <sup>*</sup>		0.00	0.02	0.01	0.01
Home GDP	0.40	0.22 <sup>*</sup>		0.42	0.46	0.51	0.39
REER	0.40	0.18 <sup>**</sup>		0.25	0.09 <sup>***</sup>	0.26	0.09 <sup>***</sup>
Size	-0.09	0.03 <sup>***</sup>		-0.08	0.02 <sup>***</sup>	-0.11	0.03 <sup>***</sup>
Capital	0.25	0.16		0.26	0.15 <sup>*</sup>	0.21	0.17
Liquidity	0.13	0.08 <sup>*</sup>		0.12	0.07 <sup>*</sup>	0.16	0.08 <sup>**</sup>
Greenfield	0.00	0.00		0.00	0.00	0.00	0.00 <sup>**</sup>
Takeover	-0.02	0.04		-0.01	0.04	-0.05	0.04
MP*Greenfield	-0.01	0.01 <sup>*</sup>					
MP*Takeover	-0.01	0.01					
Home MP_Greenfield				0.02	0.01 <sup>*</sup>		
Home MP_Takeover				-0.01	0.02		
REER_Greenfield						0.22	0.10 <sup>**</sup>
REER_Takeover						-0.02	0.23
No of obs	1027		1027		1027		
Wald (joint)	84.48	[0.000] <sup>**</sup>	77.82	[0.000] <sup>**</sup>	40.13	[0.015] <sup>*</sup>	
Sargan test	56.72	[1.000]	56.93	[1.000]	64.22	[1.000]	
AR(1)	-3.397	[0.001] <sup>**</sup>	-3.596	[0.000] <sup>**</sup>	-3.155	[0.002] <sup>**</sup>	
AR(2)	0.7479	[0.455]	1.115	[0.265]	0.5979	[0.550]	

## **5.7. Conclusions**

The aim of this paper is to investigate the role of banks in the transmission of monetary policy in Poland. For this purpose we used quarterly balance sheet data for individual banks for the period 1997-2002.

Similar to Kashyap and Stein (1995), the underlying idea of our approach was to check whether banks' reaction to the monetary policy differs depending on certain bank characteristics. We looked whether banks' credit supply depends on size, liquidity and capitalization of a bank. Recognizing high level of foreign penetration in the banking system, we also investigated whether ownership matters for the changes in banks' credit supply.

We did not find support for the bank lending channel of the monetary policy transmission in Poland. This result is not totally surprising in light of excess liquidity of the Polish banking industry, which makes it easier for all banks to continue lending even during monetary tightening.

Our findings suggest that banks' ownership matters for their lending decision. Greenfield banks exhibit particularly strong loan growth, but even they do not react heterogeneously to the changes in the monetary policy stance of the National Bank of Poland. On the other hand, greenfield banks react positively to the tightening of the monetary policy in their home countries and appreciation of Polish zloty.

When compared with similar findings for the EU we observe that during monetary contraction (expansion) Polish banks decrease (increase) their lending by far less than their counterparts in the current EMU member states. This means that Polish economy requires much larger interest rate increases in order to keep it from overheating, and much larger interest rate reductions in order to stimulate it during a downturn than the economies of the current EMU member states. The finding that foreign banks react to their home country conditions suggests that lending would be even less sensitive to the impact of the common monetary policy if Poland were a member of the EMU.

Even though our study concludes against bank lending channel in Poland, more research should be carried out in this area. First of all, it would be useful to extend the investigation with the disaggregated balance sheets data to analyze the reaction of different types of loans to the changes in the monetary policy. Second, other bank characteristics should be analyzed such as the portfolio quality. Third, the investigation on the firm level should be carried out in order to study whether SMEs suffer from reduced loan access during monetary contraction.

## **Chapter 6: Conclusions**

The present thesis analyzes the development of the Polish banking market between 1997 and 2002. Since at the end of 2003 76.7% of the banks' capital and 67.8% of the total banking assets were controlled by foreign investors, the natural focus of the thesis is the role of foreign ownership. Hence, we study the effect of foreign ownership on banks' efficiency, stock prices, and transmission of the monetary policy. Additionally, we investigate the consequences of the consolidation process that also played an important role in shaping the present Polish banking market.

In the first paper entitled "Efficiency of the Polish Banking Industry: Foreign versus Domestic Banks" we compare efficiency of foreign and domestic banks. Since we rely on the relative efficiency measure, it is of utmost importance to choose the efficient frontier with respect to which efficiency of other banks can be calculated. Unlike other studies on this subject we could reject the null hypothesis of common frontier for foreign and domestic banks, and hence we estimated efficiency separately for foreign and domestic bank. Our results indicate that foreign banks exhibit higher level of efficiency than their domestic counterparts, which is in line with the similar studies on transition banking markets. However, in our paper we distinguish between greenfield and takeover banks. We find that greenfield banks have outperformed all other banks, whereas foreign banks that took over existing institutions failed to enhance their efficiency, although they had taken over slightly more efficient institutions. To our knowledge this is the first paper that distinguishes between efficiency of greenfield and takeover banks. Therefore, it would be very interesting to apply the same methodology to other markets that are characterized by high presence of foreign owners. This is particularly important since our findings bring doubt to the common conclusion of the literature that foreign banks are more efficient than domestic ones.

In the second paper "Foreign Acquisitions and Industry Wealth Effects of Privatisation: Evidence from the Polish Banking Industry" we assume that capital market can predict effects of foreign acquisitions of Polish domestic banks. Therefore, we perform an event study to analyze the impact of announcements of foreign acquisitions on stock prices of target and non-participating banks. The innovative aspect of this study is the analysis of the reaction of the remaining domestic banks to foreign acquisitions of their peers. Since Polish capital market is characterized by low level of liquidity we rely on the aggregated coefficient method (Dimson (1979)), and regress observed bank stock returns on preceding, synchronous and subsequent market returns.

The paper concludes that target bank stock prices react positively to announcements of foreign acquisitions. Our findings also reveal that announcements of foreign acquisitions create wealth not only for the shareholders of target banks, but for the non-participating banks as well. Particularly strong abnormal returns are exhibited by the remaining domestic banks. These results support the hypothesis that high foreign ownership is beneficial for the whole banking market. The possible explanations for this could be technological spillover effects, increased competition, and enhanced stability brought by foreign investors.

The third paper “Consolidation of the Polish Banking Sector: Consequences for the Banking Institutions and the Public” analyzes costs and benefits of the banking consolidation process. For this purpose, we rely on three different methodologies: event study, financial ratio analysis, and Malmquist indices. The results of event study indicate that mergers and acquisitions have created value for shareholders of both target banks and bidder banks. However, our study indicates that the level of integration of consolidated institutions plays a very important role. Whereas most of merged banks have improved their profitability either through cost cutting or improvements in total factor productivity, acquiring banks have concentrated on gaining larger market power. The paper concludes that the consolidation has helped to purge the Polish banking market of distressed institutions.

In the fourth essay “Does the Bank Lending Channel Work in a Transition Economy? The Case of Poland” we study the role of bank in the transmission of the monetary policy. We follow the approach of Kashyap and Stein (1995) and check whether banks’ reaction to the monetary policy differs depending on certain bank characteristics. First, we look at the characteristics which are found in the traditional bank lending literature, such as size, capital, and liquidity. Further, we also include ownership dummies to see whether greenfield and takeover banks react in a different manner than domestic banks. Another innovative aspect of the study is the inclusion of variables that control for macroeconomic conditions in home countries of foreign banks, as well as we take into account real effective exchange rate, which might have an impact on capital flows.

As we anticipated, traditional bank characteristics do not play any role in the transmission of the monetary policy in Poland, which can be explained by the fact that Polish banking sector is characterized by high level of liquidity. Similarly, neither greenfield nor takeover banks react heterogeneously to the monetary policy of the Polish National Bank. However, our study reveals that greenfield banks react to the increases in interest rates in their home countries and appreciation of the zloty by expanding their loan portfolio in Poland. This has interesting and important implications for the conduct of the monetary policy, since



conditions abroad determine the magnitude of the reaction of Polish banks to the domestic monetary policy.

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