

# Foreign Banks and Credit Stability in Central and Eastern Europe: Friends or Foes?

## A Panel Data Analysis

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### Abstract

We study whether foreign and domestic banks in Central and Eastern Europe have reacted differently to business cycle conditions and host country banking crises. Our unique panel dataset comprises data of more than 300 banks for the period 1993-2000, with detailed information on bank ownership. Our analysis shows that during crisis periods domestic banks contracted their credit and deposit bases, whereas foreign banks did not. Also, home country conditions matter for foreign bank growth, as there is a significant and negative relationship between home country economic growth and host country credit by foreign banks.

*Keywords:* foreign banks, transition economies, credit growth, financial stability

*JEL codes:* C23, F36, G21, P34

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## 1. Introduction

During the last decade foreign banks have entered several Central and Eastern European (CEE) transition countries, though to different degrees. Some countries regarded foreign strategic investors in their banking system as a means to improve both the quantity and quality of financial intermediation. In contrast, critics have pointed to the risks for the stability of the financial system, emphasising the danger of a more volatile credit supply.<sup>1</sup> Although research has been done for the Latin American case – where foreign bank penetration is high as well – the empirical research on CEE is still limited. We therefore focus on ten CEE countries (Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia), using a unique panel dataset comprising balance sheet and profit & loss data (1993-2000) on more than 300 banks. We study whether foreign and domestic banks in Central and Eastern Europe have reacted differently to business cycle conditions and host country banking crises. A better understanding of this issue is of special policy relevance for those countries that still have to decide whether to open up their banking sectors for foreign competition. The remainder of this paper is structured as follows. In section 2 we give a brief overview of the literature on foreign banks and financial stability, after which we describe our dataset in section 3. Section 4 goes into our econometric methodology and empirical results. Section 5 concludes.

## 2. Foreign banks and financial stability

### 2.1 *Theoretical considerations*

There exists a lively, mostly empirically oriented debate on the penetration of foreign banks into less-developed banking systems.<sup>2</sup> The majority of this literature focuses on the influence of foreign banks' on the efficiency of domestic banking systems (e.g. Claessens et al., 2001; Lensink and Hermes, 2003). A discussion of this literature goes beyond the scope of this paper. A second, though much more limited strand of literature goes into the implications foreign bank entry has for financial stability. Before discussing this literature, it is useful to point out some theoretical considerations.

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<sup>1</sup> Recently, Stiglitz (2002) has for instance articulated this view.

<sup>2</sup> In the empirical part of this paper, we limit ourselves to the activities of foreign banks within the borders of the host country. Foreign banks can also provide *cross-border* services from home to host country. For an analysis of the importance and stability of cross-border vs. within-border foreign bank credit in CEE, see De Haas and Lelyveld (2002).

A single, comprehensive theory of multinational banking, especially in an emerging market or transition country context, is still non-existent.<sup>3</sup> Yet, some important mechanisms through which foreign banks may influence the stability of the host country banking system can be identified. Most of these theoretical mechanisms elaborate on the fact that foreign bank subsidiaries are not completely autonomous organisations, but form part of a larger bank holding company (or: parent bank) with an internationally diversified asset portfolio. As a result, their policies will to a certain extent be influenced by decisions of this (foreign-based) holding company. On the positive side, this parent bank may act as a “back-up facility” or lender of last resort during crisis periods, or may manage an internal capital market to allocate capital over its subsidiaries (Stein, 1997). This may then translate into a more stable credit supply of the foreign based subsidiary.<sup>4</sup> More specifically, a supportive parent bank and abundant funding sources may make foreign bank subsidiaries less prone to the adverse effects of a host country bank capital shock. Foreign bank subsidiaries may be able to recover relatively fast and keep up their credit supply relatively well (when compared to domestic banks).

Contrary to this potentially positive role of foreign bank subsidiaries, it can be argued that foreign banks’ credit supply may be less stable than credit by domestic banks. This will be the case if foreign banks react more procyclically to changes in the host country macroeconomic environment.<sup>5</sup> A reason for such behaviour could be that the parent bank reallocates capital over different geographical regions on the basis of expected risks and returns on investment. When economic growth in a particular host country declines, the activities of the subsidiaries in this country may be scaled down in favour of other regions. Domestic banks may not have such foreign alternative investment opportunities, and may therefore be less sensitive to host country macroeconomic conditions. In this line of reasoning, there will thus be a *positive* relationship between the *host* country business cycle and the foreign subsidiary’s credit supply.

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<sup>3</sup> Although Williams (1997) argues that internalisation theory provides a cohesive and internally consistent framework within which different (sub)theories of multinational banking can be analysed – each operationalising a specific aspect of internalisation theory, so that testable hypotheses can be developed.

<sup>4</sup> In this paper, stable foreign bank credit refers to a situation in which foreign bank lending is not crunched during or after a financial crisis, or at least not more severely than domestic lending, and in which foreign bank lending is more counter-cyclical, or at least less pro-cyclical than domestic bank lending. We thus define foreign bank credit stability in relative terms.

<sup>5</sup> Morgan and Strahan (2002) show that on the one hand, foreign bank entry may dampen the effect of a general bank capital shock on firm investment in the host country, since they can rely on parental liquidity and capital back up. On the other hand, the impact of a firm collateral shock in the host country may be amplified, as foreign banks will reallocate their portfolio on the basis of changes in expected risk/return

A different mechanism exists if foreign bank subsidiaries react not so much to changes in the host country economic conditions (“pull factor”), but rather to changes in the parent bank’s home country (“push factor”). On the one hand, worsening economic conditions in the home country can force a (capital-constrained) parent bank to scale down activities, including those of (consolidated) foreign subsidiaries. Actually, foreign operations may be among the first to be reduced. In that case, there is a *positive* relationship between the *home* country business cycle and the subsidiary’s credit supply. On the other hand, it can be argued that when economic conditions in the home country worsen, parent banks will increase their efforts to expand their activities abroad, since investment opportunities in the home market are scarce. In this scenario there is thus a *negative* relationship between the *home* country business cycle and the subsidiary’s credit supply (Jeanneau and Micu, p.6, 2002). The latter is more likely if parent banks’ capital constraints are not binding and bank holding capital is free to chase the highest returns.

Finally, differences between foreign and domestic banks are not only related to the fact that a foreign bank subsidiary is part of an international banking organisation, but can also result from other differences in bank goals and balance sheet health. Banks for instance differ in their attitude towards client relationships. Some banks may prefer to grant credit on a “transaction-by-transaction-basis”. In that case, banks increase their credit supply to meet the extra demand for finance when the economy goes up, only to decrease loan supply when economic conditions worsen. Conversely, other banks may finance their clients “through the cycle” and will not easily cut off credit lines in case of temporary adverse economic developments. Such relationship lending will be less sensitive to business cycle fluctuations or banking crises, and can therefore be characterised as relatively countercyclical and stable. Also, regardless of the ownership structure of a bank, the quality of its balance sheet may be of decisive importance in influencing credit supply. Banks that are in poor condition, will not be able to expand their credit in reaction to positive market signals, but will instead have to focus on balance sheet repair.

## 2.2 *Empirical results to date*

The empirical research to date tends to conclude that there is a positive role of foreign banks in the stability of host country credit supply, though with some qualifications. Dages et al. (2000) show for Argentina and Mexico, and Crystal et al. (2002) for Chile, Colombia and

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characteristics. The theoretical aggregated effect of foreign bank entry on host country business cycle volatility thus remains ambiguous.

Argentina, that during the second half of the 1990's foreign banks that had been present in the host country for a relatively long time, exhibited stronger and less volatile loan growth than domestic banks. Also, during times of crisis, diversity of ownership has contributed to greater stability of credit as foreign banks showed significant credit growth during crisis periods and thereafter. Peek and Rosengren (2000), Goldberg (2001), and Soledad Martinez Peria et al. (2002) also find that foreign banks did not reduce their credit supply during adverse economic times in the host country. Indeed, they viewed such economic problems as opportunities to expand, by acquisition or by growth of existing subsidiaries. De Haas and Lelyveld (2002) and Kraft (2002) find similar results for CEE countries. However, Dages et al. (2000) also find that domestically owned and foreign owned banks with low problem loan ratios behave similarly, which suggests that bank health, and not ownership per se, has been critical. Jeon and Miller (2002) find that whereas foreign bank performance in Korea is not affected by bank solvency, domestic bank performance is. They conjecture that this results from the fact that the equity position of a foreign bank subsidiary comprises only a small part of the larger equity position of the parent bank.

Notwithstanding these positive results, other empirical findings point to the fact that in certain circumstances foreign banks may also have some destabilising effects. As regards pull factors, Peek and Rosengren (2000) show that cross-border lending, where foreign banks provide credit from their home country offices, did in some cases retrench during economic slowdowns in Latin America. Morgan and Strahan (2002) find tentative evidence of a positive link between foreign bank presence and economic volatility, due to the fact that foreign banks are relatively sensitive to local business conditions as they are better able to reallocate funds outside the particular host country. As regards push factors, Jeanneau and Micu (2002) find that bank lending to emerging countries is positively correlated with the economic cycles in the major industrial countries. More specifically, Peek and Rosengren (1997) show that the sharp drop in Japanese stock prices starting in 1990, together with binding capital requirements for Japanese banks, led Japanese bank branches in the USA to reduce their credit supply ("positive push relationship"). However, Soledad Martinez Peria et al. (2002) find evidence that foreign banks, except the Japanese ones, have tended to increase their lending to Latin America when economic conditions in their home countries worsened. Calvo et al. (1993) and Hernandez and Rudolph (1995) also find that worsening home country conditions led banks to seek external lending opportunities ("negative push relationship"). Finally, Goldberg (2001) finds that U.S. banks' claims on emerging markets have been

correlated with U.S. GDP growth, although the direction of causality of this push relationship differed between Asia (negative) and Latin America (positive).

In sum, foreign bank penetration can have positive effects for total credit stability, as foreign bank subsidiaries often keep up or even expand their credit supply when local economic conditions get worse. Yet, the empirical results also show that foreign banks' host country credit may react to home country economic conditions, although the direction of this relationship is still debated. We examine whether in CEE as well, foreign and domestic banks have reacted differently to the host country business cycle and to banking crises, and whether foreign bank credit has been influenced by home country economic conditions.

### **3. BankScope dataset and descriptive statistics**

#### *3.1 The BankScope dataset*

We constructed our panel using Fitch IBCA/Bureau van Dijk's BankScope database. This database contains yearly balance sheet data and profit and loss (P&L) data for individual banks in a large number of countries. In general, the banks included in this database cover about 90% of total banking assets in a particular country (Mathieson and Roldos, 2001). To be sure that our panel was representative of our sample of transition countries, we checked the coverage of the BankScope data through a comparison with information received from regional central banks and taken from Internet. This showed that our database has a good coverage of the banking system in the countries we study. Any differences could often be explained by divergent definitions of what a bank is.<sup>6</sup> Finally, an important drawback of BankScope is that the activities of most foreign branches are not captured, since these do not report separately from their foreign headquarters. This can lead to an underestimation of the level of foreign participation. We obtained banking data for all domestic banks and foreign subsidiaries that were included in BankScope for the period 1993-2000. In total, our sample includes 321 different banks (cf. Annex 1). Before 1993, independent CEE banks had only just emerged and the quality of balance sheet data is questionable. For the year 2001, BankScope data were – at the time of downloading – only available for a limited number of banks. The development in our sample size – increasing until 1997 and decreasing afterwards

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<sup>6</sup> Our focus is on banks and their financing of the private non-bank sector. We therefore included only commercial banks, savings banks, co-operative banks, real estate / mortgage banks, and medium and long term credit banks in our sample. We excluded such categories as securities houses, non-banking credit institutions, specialised governmental credit institutions, central banks, and multilateral governmental banks.

– reflects the rapid increase in bank start-ups at the beginning of the transition process, as well as the consolidation process later on.

We examined the ownership structure of all banks for each separate year, and then constructed two ownership dummy variables for each bank in each year. The first ownership dummy (TAKEOVER) is 1 for foreign banks that are the result of a take-over and zero for all other banks. The second ownership dummy (GREENFIELD) is 1 one for foreign banks that are greenfields and zero for all other banks.<sup>7</sup> Adding ownership information for each bank *in each year* was necessary because the BankScope database only gives information on ownership structure for the point in time that the database is last updated. Since changes in ownership structure in the CEE banking sector have been frequent during the transition process and since we are particularly interested in differences between domestic and foreign banks, we thought it essential to carefully unravel all the ownership changes in our sample period. The sources for the ownership dummy variables and changes therein were Reuters, bank websites, business publications on the subject, and correspondence with CEE central bank officials.

Besides checking the coverage of our dataset and extending the ownership information, we also made a further check on data quality and consistency. Here, we corrected for the fact that not all banks report in the same currency by redenominating all balance sheet and P&L variables in millions of euro.<sup>8</sup> Additionally, we removed two banks from our sample that were included in BankScope, but did not report any financial information.

### *3.2 Differences between foreign and domestic banks in CEE: descriptive statistics*

Before we analyse whether foreign banks *behaved* differently during our sample period, we want to find out whether foreign and domestic banks have a different structure in the first place. We do this by testing whether foreign and domestic banks differ significantly on a large number of balance sheet and P&L items, and related financial ratios. We look into the (significance of) differences in the mean ( $\mathbf{m}$ ), as well as into differences in coefficients of variation ( $\mathbf{s}/\mathbf{m}$ ). We look at both the levels and growth rates and test for the whole panel sample as well as for each separate country. Lastly, we correct for mergers, acquisitions, and

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<sup>7</sup> We consider a bank to be foreign if foreign shareholders own a majority of outstanding shares. A controlling interest is generally assumed to exist if participation exceeds 50% of the subscribed capital of a bank (cf. BIS, 2003). When a domestic bank was taken over in year T, we included it as a domestic bank for T and all years before T where data were available, whereas it was included as a foreign bank for T+1 and all later years for which data were available. To the extent that banks that are taken over change only gradually, our classification would thus be too abrupt. Note, however, that this would bias our results in the direction of finding no differences between domestic and foreign banks. Greenfields are those banks that were erected from scratch by a foreign parent (the terms “greenfield” and “takeover” thus refer to *foreign* banks only).

start-ups by eliminating the bank/year observations with the 1% largest positive growth rates. The results of the significance tests for the full sample, including ten countries, are shown in Annex 2. It shows that domestic banks are on average larger than foreign banks, although the differences are in most cases not significant. An important exception is money market funding, which is higher at foreign banks (though not significantly so). This probably reflects the fact that foreign bank subsidiaries are on average less dependent on local deposits, as they can get financing relatively easily on the (international) money market or directly from the parent bank. On almost all balance sheet items domestic banks show a somewhat more volatile behaviour (higher coefficients of variation). Foreign banks tend to grow faster than domestic banks, pointing to a convergence process between small foreign banks and large domestic banks. On average, foreign banks tend to have a somewhat higher return on assets (ROA) and return on equity (ROE), though not significantly so. Domestic banks' ROE is on average negative in our sample period. Since this general picture conceals some important country specific – let alone bank specific – characteristics, we proceed by using a panel data methodology.

#### **4. Econometric methodology and results**

As far as we know, to date no empirical research exists that looks into the role of foreign banks for the stability of credit and deposits in a cross-section of CEE countries. Using our bank level data on ten CEE-countries we aim at filling part of this gap. In particular, we want to find out whether foreign bank penetration increased or decreased the stability of credit and deposits in CEE, especially during times of crisis, and whether foreign bank penetration has made total credit more dependent on foreign economic developments. To gain insight into the possible divergent behaviour of foreign and domestic banks on both the lending and the deposit side of the balance sheet, we run two sets of regressions. In the first one, we use as dependent variables the percentage growth in total loans and total deposits, respectively, of bank  $i$  in country  $j$  in year  $t$ . Besides running regressions for the whole sample, we also run regressions for domestic banks and foreign banks separately. In the second set, our dependent variables are  $\Delta MSLOAN$  and  $\Delta MSDEPO$ , which are the percentage change in the credit, respectively deposit market share of bank  $i$  in country  $j$  in year  $t$ :<sup>9</sup>

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<sup>8</sup> Before 1999 we used a “synthetic” euro to redenominate amounts in local currencies.

<sup>9</sup> We estimate percentage changes in market shares in order to take into account that a 1%-point increase in market share is a different achievement depending on the initial market share. Market share increases from 3% to 4%, respectively 50% to 51%, for instance, represent both a 1%-point increase, whereas in terms of percentage the former increase (+33%) is much larger than the latter (+2%).

$$(1) \quad \Delta MSLOAN_{i,t} = \left[ \frac{\left( \frac{LOAN_{i,t}}{\sum LOAN_{j,t}} - \frac{LOAN_{i,t-1}}{\sum LOAN_{j,t-1}} \right)}{\left( \frac{LOAN_{i,t-1}}{\sum LOAN_{j,t-1}} \right)} \right] \times 100$$

$$(2) \quad \Delta MSDEPO_{i,t} = \left[ \frac{\left( \frac{DEPO_{i,t}}{\sum DEPO_{j,t}} - \frac{DEPO_{i,t-1}}{\sum DEPO_{j,t-1}} \right)}{\left( \frac{DEPO_{i,t-1}}{\sum DEPO_{j,t-1}} \right)} \right] \times 100$$

In this second set of regressions we thus aim to explain the growth of bank  $i$  in country  $j$  in a particular year relative to the growth of the total banking system in country  $j$  in that year. In this way, we correct for (macro)economic factors that influence the banking sector as a whole, such as the business cycle and the related *demand* for credit, and are able to focus on bank specific changes in the *supply* of credit. In a similar vein, we are interested in the relative change of the amount of deposits of bank  $i$ .<sup>10</sup> Note, however, that by estimating changes in market shares, in order to control for credit demand, we implicitly assume that all (domestic and foreign) banks grant credit to the same market segments and customer types. This is a rather strict assumption and changes in banks' market share may therefore still partly be driven by different credit demand functions. As we do not have data on banks' customer types, we are unfortunately not able to control for such heterogeneous customer markets.<sup>11</sup>

Taking into account the theoretical considerations of section 2.1, we formulate three hypotheses with regard to differences between foreign banks and domestic banks in CEE. First, we expect that foreign banks' credit is relatively insensitive to – or even positively related to – host country crisis periods, as they may rely on parental back-up support. On the other hand, we expect domestic banks' credit to be negatively related to crisis periods. Second, we expect foreign bank credit to be positively and relatively strongly related to the host country business cycle (pull relationship), whereas the sign of the relationship with the home country business cycle is ambiguous (push relationship). A strong and positive pull

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<sup>10</sup> We excluded all banks for which we had less than three years of data. This left us with a panel of 278 banks. Also, after close inspection of the data, we decided to exclude all bank/year combinations that were among the 1% quickest growers.

<sup>11</sup> Moreover, in the first set of regressions we estimate simple credit growth (instead of market share growth) and there as well, loan growth may be partly related to changes in loan demand rather than loan supply. Therefore, when discussing our empirical results we will speak of changes in credit rather than changes in credit supply.

relationship would point to reallocative behaviour of parent banks, which may also cause a negative home country effect. However, to the extent that bank holdings are severely capital constrained such a push relationship would actually be positive. In that case, bank holdings will not be able to react to deteriorating home country circumstances by expanding into CEE, but will instead have to crunch credit across the board. Third – taking into account the possibility of an internal capital market at the bank holding – we expect that foreign bank subsidiary’s credit is less sensitive to bank solvency when compared to domestic bank credit.

We test the above hypotheses as follows. First, we capture the effect of foreign ownership through the dummy variables TAKEOVER and GREENFIELD. We expect the coefficients to be positive, reflecting higher on average growth rates of foreign banks. Second, in the separate regressions for domestic and foreign banks we use a CRISIS dummy variable, which takes on value 1 if the CEE host country experienced a banking crisis in that particular year, whereas it is zero otherwise.<sup>12</sup> We expect the coefficient of this variable to be negative for domestic banks, but insignificant or positive for foreign banks. In the full sample regressions (including both domestic and foreign bank observations) we include two interaction terms that capture whether the marginal effect of being a foreign bank depends on the existence of a banking crisis. These variables are the product of GREENFIELD and TAKEOVER, and the CRISIS dummy. Here, we expect that the total marginal effect of being a foreign bank is positive, even during times of crisis.

Besides these dummy variables, we employ a number of macroeconomic variables. First, we use home country variables (which are thus 0 for domestic banks). They include home country GDP growth (HOME  $\Delta$  GDP), home country average deposit rate (HOME DEPOSIT RATE), and home country average bank lending rate (HOME LENDING RATE).<sup>13</sup> Second, we use comparable host country variables, which apply to both foreign and domestic banks: HOST  $\Delta$  GDP, HOST DEPOSIT RATE, HOST LENDING RATE, and the host country inflation rate (HOST INFLATION).<sup>14</sup> Thirdly, we experiment with combinations of host and home variables, as

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<sup>12</sup> The construction of this dummy was mainly based on an overview of systemic banking crises as described in Caprio and Klingebiel (2002) (we would like to thank Daniela Klingebiel for providing us with the latest version). Of course, some subjectivity is associated with identifying the precise occurrence of banking crises. According to Caprio and Klingebiel (2002, p. 1) “*the dates attached to the crises reviewed are those generally accepted by finance experts familiar with the countries, but their accuracy is difficult to determine in the absence of the means to mark portfolios to market values*”. See Annex 3 for an overview.

<sup>13</sup> All variables are taken from the International Financial Statistics (IFS) database (IMF). We also experimented with interest rates from other sources, such as the money market rate and the government bond yield. Since these are highly correlated with the deposit rate and the lending rate ( $r > .75$  in all cases), our results are robust to the precise choice of short and long term interest rates.

<sup>14</sup> In the ordinary growth regressions (table 1<sup>a</sup> and 1<sup>b</sup>) we also included country dummy variables, so as to take into account that banking systems as a whole may have shown different growth rates across countries.

foreign bank subsidiaries may not so much react to home or host country conditions per se, but rather to the difference between them. These include host country GDP growth minus home country GDP growth (HOST – HOME  $\Delta$  GDP), host country minus home country lending rate (HOST – HOME LENDING RATE), and host country minus home country deposit rate (HOST – HOME DEPOSIT RATE). We expect that foreign banks are positively and relatively strongly related to host country GDP growth, while the sign of the coefficient for home country GDP growth is undetermined. Furthermore, we expect that higher host (home) country lending rates will be positively (negatively) related to host country credit growth by foreign banks. Finally, we expect a positive sign for the host country inflation rate, as higher inflation will tend to inflate banks' (nominal) balance sheets.<sup>15</sup> On the deposit side, we expect similar signs for the home country variables as on the credit side. To the extent that foreign banks' balance sheets are driven by credit expansion, local deposits may actually reflect the asset side of banks' balance sheets. However, to the extent that a bank's deposit base is the result of depositor behaviour, we would expect home country conditions not to matter. Instead, depositors will choose a bank to put their funds on the basis of its (perceived) reliability. Therefore, we expect a positive sign for the coefficients of the ownership dummies as well as the solvency variable (equity to total assets).

Lastly, we include a set of bank specific regressors in order to control for other bank characteristics, besides ownership, that may influence a bank's tendency to expand its loan portfolio or deposit base. These include equity to total assets, as a measure of bank SOLVENCY (+), liquid assets to total assets, as a measure of LIQUIDITY (+), total bank assets to total banking assets in the particular country, as a measure of SIZE (-), ROA as a measure of bank PROFITABILITY (+), and finally net interest margin, as a measure of bank EFFICIENCY (+) (in parentheses the expected sign). We expect foreign bank subsidiaries to be less sensitive to their own capital position when compared to domestic banks, as their credit growth may be influenced relatively strongly by the capital position of their holding company.

We estimated both regression specifications using several estimation methods. First, we applied pooled ordinary least squares (OLS), assuming that a common error structure applies to all banks. Yet, treating banks as homogeneous entities is most likely too strong a

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However, we did not include country dummy variables in the market share regressions (table 2), since in these specifications the dependent variable already includes information about the growth of the particular banking system.

<sup>15</sup> Note that since all our balance sheet variables – including credit amounts – are denominated in euro's, using the host country inflation rate as a regressor will also partly correct for any variance in credit amounts that is due to nominal exchange rate changes. Of course, this correction will only apply to the extent that (i) such

restriction. We therefore assume that all (unobservable) factors that influence individual bank behaviour, but that are not captured by our regressors can be summarised by a random error term. Another option would have been to estimate the bank specific effects as fixed parameters. However, this would imply that – since our panel contains many banks relative to years – many degrees of freedom would be lost.<sup>16</sup> Also, we are not so much interested in the value of  $\mu_i$  for a particular bank, but rather in making inferences with respect to population characteristics. Thus we estimated the following random effects (RE) model:

$$(3) \quad gr_{it} = \mathbf{a} + \mathbf{b}_1 TAKEOVER_{it} + \mathbf{b}_2 GREENFIELD_i + \mathbf{b}_3 CRISIS_{it} + \mathbf{b}_4 MACRO_{it} + \mathbf{b}_5 CONTR_{it} + \mathbf{m}_i + \mathbf{e}_{it}$$

Where

$gr_{it}$  is percentage credit or deposit (market share) growth of bank  $i$  in year  $t$

$\mathbf{a}$  is the intercept term

$TAKEOVER_{it}$  and  $GREENFIELD_i$  are the takeover and (time-invariant) greenfield dummy

$CRISIS_{it}$  is a matrix of crisis related variables (crisis dummy and interaction terms)

$MACRO_{it}$  is a matrix of GDP growth, interest rate, and inflation variables

$CONTR_{it}$  is a matrix of bank specific control variables

$\mu_i$  is the unobserved, panel-level random effect,  $\mathbf{m}_i \sim \text{IID}(0, \mathbf{s}_m^2)$

$\mathbf{e}_{it}$  is the idiosyncratic error,  $\mathbf{e}_{it} \sim \text{IID}(0, \mathbf{s}_e^2)$

$\beta_1, \dots, \beta_5$  are the coefficients (or coefficient vectors)

$i=1, \dots, N$  where  $N$  is the number of banks in the sample

$t=1, \dots, T_i$  where  $T_i$  is the number of years in the sample for bank  $i$

In addition to the above basic random effects specification, we used two additional estimation techniques. First, we estimated a model using feasible generalised least squares (FGLS) in which we combine a heteroscedastic error structure – allowing for bank specific variance – with an AR(1) process where the correlation parameter is allowed to be unique for each bank

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nominal exchange rate changes indeed reflect changes in relative inflation rates (relative PPP holds) and (ii) eurozone inflation has shown a relatively stable development.

<sup>16</sup> We tested for our final regression specifications whether OLS, FE, or RE was to be preferred (using both the Hausman specification test and the Breusch Pagan Lagrangian multiplier test). The results presented weak evidence that the individual effects ( $\mu_i$ ) were not significantly correlated with the explanatory variables, so that random effects was the best way to model bank level specificities. Fries et al. (2002), also using a bank panel on CEE, conclude the same. However, the results of the specification tests depend very much on the exact regression specification. In particular, in table 1<sup>b</sup> the tests for the full sample showed that fixed effects was to be preferred, so that we used the Hausman and Taylor (1981) procedure.

(so as to take into account bank specificities – such as management and its strategies – that do not adjust instantaneously to changes in the (economic) environment):

$$(4) \quad \mathbf{m}_i \sim \text{IID} \left( 0, \mathbf{s}_m^2 \right)$$

And

$$(5) \quad \mathbf{e}_{it} = \mathbf{r}_i \mathbf{e}_{i(t-1)} + \mathbf{u}_{it}, \text{ where } \mathbf{u}_{it} \sim \text{IID} \left( 0, \mathbf{s}_u^2 \right) \text{ and } -1 < \mathbf{r}_i < 1$$

Second, we apply panel-corrected standard error (PCSE) estimates with exactly the same error structure as the FGLS-model: bank level heteroscedasticity combined with an AR(1) process. The reason for doing this is that the FGLS standard error estimates may be unacceptably optimistic (Beck and Katz, 1995). Our (significant) FGLS results indicated that this was indeed the case. Finally, in table 1<sup>b</sup> the full sample estimates were estimated using the Hausman and Taylor (1981) estimator (see footnote 16). In this way we were able to apply fixed effects – which was in this case recommended on the basis of the relevant test statistics – while still being able to estimate the parameter of our time-invariant greenfield dummy.<sup>17</sup> Our final estimation results are reproduced in tables 1<sup>a</sup>, 1<sup>b</sup>, and 2.

Table 1<sup>a</sup> and 1<sup>b</sup> reproduce the estimation results with the simple growth variables as dependent variables. The difference between table 1<sup>a</sup> and 1<sup>b</sup> is that in the former we use relative macroeconomic variables, whereas in the latter we use separate home and host country regressors. In table 1<sup>a</sup> regressions were run on the full sample, a sub-sample of domestic banks, and a sub-sample of foreign banks. Since by definition only foreign banks have home countries, table 1<sup>b</sup> only reports regressions for the full sample and the foreign bank subsample. Table 2 shows the regressions for changes in market share, rather than simple loan and deposit growth. For each side of the balance sheet, we first estimated a regression with home country macroeconomic regressors, and secondly a regression with relative macroeconomic regressors (“host minus home”). Note that – since we are estimating changes in individual banks’ market shares – we cannot include separate host country macroeconomic regressors in this case, as host country conditions will act upon the complete banking system and can thus not explain changes in individual banks’ market shares.

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<sup>17</sup> This estimator cannot be used in the domestic bank estimates in table 1<sup>b</sup> and the estimates in table 2 since in the former case there is no time invariant endogenous variable available (such as the greenfield dummy), whereas in the latter case there are not enough time invariant exogenous variables that can be used as strong (internal) instruments. For reasons of comparability and consistency, we use in these cases the standard PCSE-estimates.

**Table 1<sup>a</sup> Credit growth and deposit growth in Central and Eastern Europe**

	Credit side			Deposit side		
	<i>Full sample</i>	<i>Domestic banks</i>	<i>Foreign banks</i>	<i>Full sample</i>	<i>Domestic banks</i>	<i>Foreign banks</i>
TAKEOVER	-1.08 (0.11)			8.58 (0.83)		
GREENFIELD	25.44* (1.95)		24.48* (1.77)	5.93 (0.57)		6.24 (0.49)
TAKE*CRISIS	11.52 (0.40)			35.91 (0.98)		
GREEN*CRISIS	12.16 (0.87)			-3.34 (0.41)		
CRISIS		-19.55*** (3.17)	14.09 (1.04)		-24.69*** (3.76)	-5.62 (0.72)
HOST-HOME Δ GDP	3.70** (2.40)		5.74*** (3.68)	4.61*** (4.01)		4.90*** (4.63)
HOST-HOME LEND. RATE	0.87** (2.14)		-0.28 (0.47)			
HOST Δ GDP		6.36*** (6.11)			2.97*** (2.61)	
HOST LEND. RATE		-0.28 (0.48)				
HOST INFLATION	0.67*** (3.66)	0.63*** (3.27)	1.74*** (2.58)	0.49*** (3.98)	0.42** (2.55)	1.70** (2.06)
HOST-HOME DEPO. RATE				0.52 (0.84)		-0.05 (0.08)
HOST DEPO. RATE					1.94*** (2.84)	
SOLVENCY	0.50* (1.95)	0.49* (1.87)	0.39 (0.70)	0.57* (1.87)	0.53 (1.48)	0.37 (0.51)
LIQUIDITY	-1.23 (0.87)	-0.54 (0.39)	-4.10 (1.47)	-1.57 (1.56)	-2.65** (2.24)	-2.02 (1.31)
SIZE	-82.55*** (2.94)	-39.13 (1.39)	70.98 (0.63)	-61.01*** (2.77)	-44.29* (1.89)	163.45 (1.35)
PROFITABILITY	2.09*** (3.71)	1.57*** (3.22)	-1.00 (0.41)	1.55*** (3.39)	2.30*** (4.59)	-2.28 (1.35)
INTEREST MARGIN	2.19*** (3.08)	3.01*** (4.85)	0.85 (0.36)	1.45* (1.90)	0.02 (0.02)	-1.25 (0.61)
Observations	1048	737	311	1077	701	338
No. of banks	251	176	94	245	163	88
Prob> $\chi^2$	0.27	0.02	0.19	0.05	0.01	0.07
R <sup>2</sup>	0.22	0.29	0.26	0.22	0.25	0.33

Absolute z-values in parentheses and italics; \* significant at 10%; \*\* at 5%; \*\*\* at 1%

Panel-corrected standard error (PCSE) estimates. Disturbances: heteroscedasticity corrected and AR(1) process

Country dummy variables and constant not shown. Prob>  $\chi^2$  : p-value Hausman specification test statistic

**Table 1<sup>b</sup> Credit growth and deposit growth in Central and Eastern Europe**

	Credit side		Deposit side	
	<i>Full sample</i>	<i>Foreign banks</i>	<i>Full sample</i>	<i>Foreign banks</i>
TAKEOVER	24.11 <i>(1.19)</i>		27.81 <i>(1.58)</i>	
GREENFIELD	41.95** <i>(2.25)</i>	24.70* <i>(1.77)</i>	20.76 <i>(1.16)</i>	6.66 <i>(0.52)</i>
TAKE*CRISIS	-28.58 <i>(0.55)</i>		-12.37 <i>(0.33)</i>	
GREEN*CRISIS	23.59 <i>(1.58)</i>		-4.65 <i>(0.40)</i>	
CRISIS		11.72 <i>(0.73)</i>		-8.37 <i>(0.94)</i>
HOST Δ GDP	5.81*** <i>(5.23)</i>	4.89* <i>(1.70)</i>	3.69*** <i>(3.72)</i>	6.08*** <i>(3.36)</i>
HOME Δ GDP	-6.00** <i>(2.43)</i>	-6.35*** <i>(3.47)</i>	-3.00 <i>(1.25)</i>	-4.06*** <i>(2.74)</i>
HOST LEND. RATE	-0.38 <i>(0.65)</i>	0.09 <i>(0.05)</i>		
HOME LEND. RATE	0.33 <i>(0.54)</i>	0.29 <i>(0.50)</i>		
HOST INFLATION	0.80*** <i>(4.15)</i>	1.59** <i>(2.01)</i>	0.57*** <i>(3.16)</i>	0.28 <i>(0.16)</i>
HOST DEPO. RATE			0.54 <i>(0.87)</i>	2.22 <i>(1.06)</i>
HOME DEPO. RATE			1.32 <i>(0.99)</i>	0.75 <i>(1.11)</i>
SOLVENCY	0.94** <i>(2.10)</i>	0.38 <i>(0.69)</i>	-0.12 <i>(0.28)</i>	0.21 <i>(0.29)</i>
LIQUIDITY	-0.99 <i>(0.65)</i>	-4.17 <i>(1.50)</i>	-2.92** <i>(2.36)</i>	-2.28 <i>(1.43)</i>
SIZE	-53.85 <i>(0.66)</i>	75.61 <i>(0.67)</i>	-6.97 <i>(0.09)</i>	164.30 <i>(1.38)</i>
PROFITABILITY	1.49** <i>(2.01)</i>	-1.08 <i>(0.45)</i>	2.31*** <i>(3.51)</i>	-2.48 <i>(1.44)</i>
INTEREST MARGIN	0.01 <i>(0.01)</i>	0.85 <i>(0.37)</i>	1.13 <i>(1.10)</i>	-0.89 <i>(0.41)</i>
Observations	1048	311	1039	338
No. of banks	251	94	232	88
Prob> $\chi^2$	n.a.	0.24	n.a.	0.39
R <sup>2</sup>	n.a.	0.26	n.a.	0.33

Absolute z-values in parentheses and italics; \* significant at 10%; \*\* at 5%; \*\*\* at 1%

Full sample estimates: Hausman and Taylor (1981) estimator.

Foreign banks estimates: panel-corrected standard error (PCSE) with disturbances heteroscedasticity corrected and AR(1) process. Country dummy variables and constant not shown.

Prob>  $\chi^2$  : p-value Hausman specification test statistic.

**Table 2 Market share growth in Central and Eastern European credit and deposit markets**

	Credit side	Credit side	Deposit side	Deposit side
TAKEOVER	22.24** (2.25)	11.78 (1.36)	12.13 (1.15)	18.58** (2.52)
GREENFIELD	51.49*** (5.23)	35.98*** (3.90)	24.04** (2.45)	27.04*** (3.58)
TAKE*CRISIS	8.31 (0.33)	2.39 (0.07)	32.94 (0.91)	43.95 (1.40)
GREEN*CRISIS	-28.51** (2.55)	-28.04** (2.44)	-4.42 (0.52)	-7.20 (0.87)
HOME Δ GDP	-3.27* (1.86)		-2.95* (1.95)	
HOST-HOME Δ GDP		1.90 (1.28)		2.33** (2.22)
HOME LEND. RATE	0.36 (0.96)			
HOST-HOME LEND .RATE		0.71 (1.36)		
HOME DEPO. RATE			0.17 (0.37)	
HOST-HOME DEPO. RATE				-0.24 (0.46)
SOLVENCY	0.29* (1.68)	0.30 (1.60)	0.65** (2.42)	0.58** (2.25)
LIQUIDITY	1.18 (1.38)	1.14 (1.33)	1.79** (2.14)	0.10 (0.25)
SIZE <sup>†</sup>	-0.00 (0.43)	-0.00 (0.44)	-0.002*** (3.74)	-0.00 (0.84)
PROFITABILITY	0.66 (1.28)	0.60 (1.14)	1.20*** (3.21)	-0.51 (0.91)
INTEREST MARGIN	2.65*** (2.95)	2.49*** (2.69)	0.89 (1.47)	2.42*** (2.65)
CONSTANT	-10.57* (1.82)	-9.657 (1.53)	26.57*** (4.23)	-12.85** (2.08)
Observations	1051	1049	1101	1079
No. of banks	251	251	255	245
Prob> $\chi^2$	0.01	0.04	0.01	0.00
R <sup>2</sup>	0.12	0.12	0.18	0.10

z-values in parentheses and italics; \* significant at 10%; \*\* at 5%; \*\*\* at 1%

Panel-corrected standard error (PCSE) estimates. Disturbances: heteroscedasticity corrected and AR(1) process

Prob>  $\chi^2$  : p-value Hausman specification test statistic

†: defined as “total assets” instead of “total assets to total banking assets in particular country” (as in tables 1<sup>a</sup> and 1<sup>b</sup>)

On the credit side we find that greenfield banks have been growing faster than both domestic banks and takeovers. Partly, this reflects the fact that greenfields, by definition, start from scratch and we would thus expect higher growth rates resulting from a convergence process. The estimations in table 2, where the dependent variables are changes in market shares, also capture the fact that greenfields have been the fastest growing banks during the transition period. Here, we find a significant effect of takeovers when compared to domestic banks as well. Overall, takeover banks have been able to expand their credit market share when compared to domestic banks, though not as fast as greenfield banks did. These results are in

line with the existing empirical results (cf. section 2.2), which found that foreign banks that have been present in the host country for a relatively long time – such as many greenfields – exhibited stronger loan growth than domestic banks.

A second issue we are interested in is whether foreign banks behaved differently from domestic ones during crisis periods. Our results show that this has indeed been the case. The sub-sample estimations in table 1<sup>a</sup> (and 1<sup>b</sup>) show that whereas the crisis dummy is insignificant in the foreign bank regressions, it enters negatively and significantly in the domestic bank sample. During crisis periods domestic banks thus contracted their credit and deposits, whereas foreign banks did not show any reduction at all. However, table 2 shows that while greenfield banks still expanded their market share during crisis periods, they did so much more slowly than during more stable economic times.<sup>18</sup> We can thus confirm the results other authors have found for Latin America, and which show that foreign banks have kept up credit during crisis periods.

Next we are interested in the effect of home and host country conditions on foreign bank activities in CEE. Here, tables 1<sup>a</sup> and 1<sup>b</sup> clearly show a positive and significant effect of inflation on (nominal) credit growth.<sup>19</sup> More importantly, we find a significant and *negative* influence of home country GDP growth on foreign banks' host country credit. The first and third column of table 1<sup>a</sup> clearly show that there is a very significant influence of the *relative* development in growth rates between host and home countries on foreign banks' activities. More specifically, table 1<sup>b</sup> and the first column of table 2 show that this result is mainly driven by the sensitivity of foreign banks to home market effects. When economic growth decreases in the home country, foreign banks start to focus their activities on the regions where investment opportunities are relatively abundant. In contrast with this strong negative relationship between *home* country growth and host country credit, there is only a weak (10%-level) positive effect of *host* country growth on host country credit.<sup>20</sup> Apparently, foreign banks credit expansion is more affected by the home country business cycle (“push factor”) than it is by the host country business cycle (“pull factor”).<sup>21</sup> Our results are thus in line with

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<sup>18</sup> To see this, take a look at the first column of table 2. Here it is shown that during a “normal” year a greenfield bank expands its market share 51% (thus not percentage points!) faster than the average bank does. During a crisis period, this positive effect of being a greenfield bank on credit market share growth declines to 23% (51.49%-28,51%).

<sup>19</sup> In the market share estimates as reported in table 2 we did not include host country inflation as a regressor, since whereas it can be expected that inflation has a positive influence on absolute nominal credit growth, there is no such theoretical expectation as regards the influence of inflation on a bank's market share growth.

<sup>20</sup> We also ran a regression for foreign banks with exactly the same specification as the one for domestic banks, that is without the greenfield dummy and without any home country variables. Here the relationship between foreign bank credit and host country economic growth completely disappeared.

<sup>21</sup> See also Jeanneau and Micu (2002) on the complementarity of push and pull factors.

those of Calvo et al. (1993) and Hernandez and Rudolph (1995), and more recently those of Goldberg (2001) (for emerging Asia) and Soledad Martinez Peria et al. (2002), all of which find a negative correlation between home country GDP growth and host country credit.<sup>22</sup> In addition we find that domestic banks increase their credit when economic growth in the host country increases, possibly in reaction to a growing credit demand (see the second column in table 1<sup>a</sup>). Also, we find – contrary to what we expected – that this effect is economically more significant when compared with foreign banks.<sup>23</sup> Apparently, domestic banks' credit is more sensitive to local economic conditions than foreign banks' credit. Lastly, we do not find any significant results as regards the lending and deposit interest rates, except for the fact that when deposit rates increase, especially the domestic banks seem to profit (table 1<sup>a</sup>, fifth column).

The bank-specific control variables also show some interesting results. In table 1<sup>a</sup> we can see that foreign banks are apparently much more homogenous than their domestic competitors, as none of the control variables is significant for the foreign banks. Yet, the domestic sub-sample clearly shows that domestic banks with a higher solvency, a higher profitability and/or a higher interest margin are the faster growing banks. These results confirm those of Jeon and Miller (2002) for Korea, who find that domestic banks' performance is related to their solvency, whereas foreign bank performance is not. Our results are also in line with earlier findings by Houston et al. (1997), who show that internal capital markets make subsidiary banks' loan growth relatively insensitive to the subsidiary's own capitalisation.

## **5. Conclusions**

The transition process from plan to market has proved to be an opportunity for many foreign banks to expand their activities to CEE. For the countries involved, foreign strategic investors and the capital and knowledge they brought with them, have been a way to strengthen their banking systems and to improve the low level of financial intermediation. Still, there are also some concerns about the growing influence of foreign banks in these regional banking markets. These mainly relate to the possibility that foreign banks turn out to be instable sources of bank credit, especially during financial crises or during economic downturns (either in CEE or in their home markets).

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<sup>22</sup> It should be noted that our sample period includes at most eight years, which is a relatively short time span to make inferences about the potential effects of business cycle fluctuations.

Using a large and detailed panel dataset on both domestic and foreign banks in this region, we do not find evidence of such destabilising behaviour. On the contrary, our empirical analysis shows that during crisis periods, domestic banks contracted their credit and deposits, whereas foreign banks did not show a reduction. There is also evidence that home country conditions mattered for foreign bank expansion. We find a significant and negative relationship between home country economic growth and host country credit by foreign bank subsidiaries. Apparently, foreign bank subsidiaries have not so much been squeezed by (capital-constrained) parent banks during difficult economic times in the home country, but rather been stimulated to increase their credit in order to make up for the lack of profitable investment opportunities in the home country. This result, together with the fact that foreign subsidiaries (in contrast with domestic banks) appear not to be capital-constrained, points in the direction of a strong influence of the foreign holding company on its CEE-subsidaries. It is consistent with the existence of an internal capital market in which the parent bank allocates scarce capital among its subsidiaries on the basis of expectations of national risk/return characteristics.

In sum, our findings show that – in terms of stability – foreign banks in CEE behave as friends rather than foes. They contribute to a stable development of bank credit in CEE, especially in the case of greenfield banks with a relatively long presence, and have been able to expand their market shares relative to domestic banks. Although we find evidence of international transmission of business cycles, the fact that we also find that domestic banks react relatively procyclically to local conditions implies that foreign bank entry has diversified and stabilised total credit. At the same time, our results suggest that diversification of foreign banks on the basis of their home markets may further diminish the risks of significant spill-overs from individual home countries. Lastly, it should be noted that the operation of internal capital markets may make foreign bank subsidiaries less dependent on local monetary conditions and more dependent on capital and liquidity provision of the foreign-based holding company. Our results thus also have a bearing on the implications of foreign bank entry on the (in)effectiveness of domestic monetary policy.

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<sup>23</sup> The coefficient for domestic banks is 6.36 (1%-level, table 1<sup>a</sup>, second column) and that for foreign banks is 4.89 (10%-level, table 1<sup>b</sup>, second column).

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### Annex 1 Number of all, domestic, and foreign (of which greenfield) banks in dataset

Year		Croatia	Czech Rep.	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovak Rep.	Slovenia	Total
1993	All	16	14	2	11	4	2	16	2	7	7	81
	Domestic	16	7	2	4	4	2	12	2	5	6	60
	Foreign	0	7	0	7	0	0	4	0	2	1	21
	Greenfield	0	7	0	7	0	0	4	0	2	1	21
1994	All	25	23	3	19	12	3	28	4	11	11	139
	Domestic	25	13	3	7	10	3	22	3	8	10	104
	Foreign	0	10	0	12	2	0	6	1	3	1	35
	Greenfield	0	10	0	10	2	0	6	1	3	1	33
1995	All	28	25	5	22	15	5	33	5	14	17	169
	Domestic	28	14	5	8	13	5	25	4	10	14	126
	Foreign	0	11	0	14	2	0	8	1	4	3	43
	Greenfield	0	11	0	11	2	0	8	1	3	3	39
1996	All	34	28	9	23	17	7	39	8	19	24	208
	Domestic	34	16	9	8	15	7	29	5	11	20	154
	Foreign	0	12	0	15	2	0	10	3	8	4	54
	Greenfield	0	12	0	11	2	0	10	3	6	4	48
1997	All	40	29	9	25	23	10	41	10	20	24	231
	Domestic	38	16	9	8	18	10	28	5	11	20	163
	Foreign	2	13	0	17	5	0	13	5	9	4	68
	Greenfield	2	13	0	13	4	0	11	5	7	4	59
1998	All	35	24	5	24	20	9	42	24	21	20	224
	Domestic	31	11	5	4	15	9	25	13	11	15	139
	Foreign	4	13	0	20	5	0	17	11	10	5	85
	Greenfield	3	11	0	13	3	0	13	11	8	4	66
1999	All	34	25	4	28	19	9	43	25	16	19	222
	Domestic	28	10	4	4	13	7	24	13	8	14	125
	Foreign	6	15	0	24	6	2	19	12	8	5	97
	Greenfield	5	12	0	16	3	0	14	11	6	4	71
2000	All	31	23	4	29	20	9	38	21	15	19	209
	Domestic	22	9	2	3	15	6	15	12	7	14	105
	Foreign	9	14	2	26	5	3	23	9	8	5	104
	Greenfield	6	10	0	17	3	0	13	9	6	4	68

## Annex 2 Results t-tests level and growth differences between domestic and foreign banks

Variable	Dom. banks	For. banks	D ≠ F	D < F	D > F	Dom. banks	For. banks	D ≠ F	D < F	D > F	s/m	s/m
	<i>level</i>	<i>level</i>	<i>level</i>	<i>level</i>	<i>level</i>	<i>growth</i>	<i>growth</i>	<i>growth</i>	<i>growth</i>	<i>growth</i>	<i>dom.</i>	<i>for.</i>
Loans	607	370	0,38	0,81	0,19	39	66	0	0	1	6,10	3,05
Cust. loans	636	386	0,36	0,82	0,18	39	66	0	0	1	5,87	3,10
Probl. loans	69	62	0,83	0,59	0,41	87	184	0,33	0,16	0,84	2,64	2,92
Demand dep.	242	196	0,51	0,74	0,26	55	153	0,22	0,11	0,89	2,52	2,11
Total dep.	1136	677	0,28	0,86	0,14	66	559	0,33	0,17	0,83	4,97	3,10
Money market funding	40	116	0,33	0,16	0,84	290	153	0,39	0,81	0,19	3,42	5,37
Liabilities	1308	789	0,29	0,85	0,15	46	193	0,29	0,15	0,85	4,95	3,38
Assets	1360	894	0,37	0,82	0,18	32	45	<b>0,04</b>	<b>0,02</b>	0,98	4,84	3,51
Loan loss reserves	15	2	<b>0,03</b>	0,98	<b>0,02</b>	261	536	0,5	0,25	0,75	1,91	1,31
Non-earning assets	174	75	0,19	0,9	<b>0,1</b>	45	99	0	0	1	5,94	4,79
Equity investments	20	21	0,92	0,46	0,54	151	354	0,27	0,13	0,87	8,19	6,28
Fixed assets	105	45	0,29	0,85	0,15	39	28	0,12	0,94	<b>0,06</b>	7,45	5,54
Liquid assets	325	229	0,56	0,72	0,28	80	182	<b>0,08</b>	<b>0,04</b>	0,96	5,95	5,02
Net interest revenue	32	31	0,96	0,52	0,48	26	65	0,11	<b>0,05</b>	0,95	4,29	3,56
Profit bef. tax	58	7	0,3	0,85	0,15	-1662	-25	0,27	0,13	0,87	12,52	8,80
Net income	48	5	0,31	0,84	0,16	-130	40	0,37	0,18	0,82	13,23	8,00
Equity	52	105	0,54	0,27	0,73	109	25	0,58	0,71	0,29	21,79	4,66
Government securities	240	132	0,16	0,92	<b>0,08</b>	129	480	<b>0,07</b>	<b>0,03</b>	0,97	3,33	2,07
Total securities	213	140	0,26	0,87	0,13	632	561	0,86	0,57	0,43	3,28	3,22
Total revenue	333	109	0,11	0,94	<b>0,06</b>	58	56	0,94	0,53	0,47	6,15	3,09
Total expenses	317	98	0,13	0,94	<b>0,06</b>	46	48	0,81	0,41	0,59	6,55	3,94
Operating income	16	11	0,66	0,67	0,33	-1402	-3	0,34	0,17	0,83	8,34	8,39
Loanloss provisions to interest reven.	29	9	<b>0,02</b>	0,99	<b>0,01</b>	-	-	-	-	-	4,26	3,02
Equity / assets	16	16	0,98	0,49	0,51	42	-3	0,63	0,69	0,31	0,88	0,69
Interest margin	6	6	<b>0,08</b>	0,96	<b>0,04</b>	4	24	0,32	0,16	0,84	0,91	0,61
Roa	0	1	0,23	0,12	0,88	-26	89	0,46	0,23	0,77	18,90	3,18
Roe	-2	6	0,15	<b>0,08</b>	0,92	-124	133	0,37	0,18	0,82	-	6,78
Cost / income	70	77	0,38	0,19	0,81	22	9	0,49	0,76	0,24	1,33	0,66

Level variables in millions of euro, growth variables in percentages (grey shading)

D ≠ F: p-value of two-sided t-test on equality of means.  $H_1: \mu_{(\text{domestic banks})} \neq \mu_{(\text{foreign banks})}$

D < F: p-value of one-sided t-test on equality of means.  $H_1: \mu_{(\text{domestic banks})} < \mu_{(\text{foreign banks})}$

D > F: p-value of one-sided t-test on equality of means.  $H_1: \mu_{(\text{domestic banks})} > \mu_{(\text{foreign banks})}$

P-values equal to or smaller than 10% **bold**

### Annex 3 Overview of systemic banking crises

We constructed our CRISIS-dummy by assigning a value of “1” to all bank/year-combinations that were confronted with a banking crisis in the particular host country. An overview of banking crises in CEE was put together on the basis of Caprio and Klingebiel (C&K) (2002), with a small number of adjustments and further specifications as regards the precise timing of the crises (see below).

<i>Country</i>	<i>Crisis years</i>	<i>Additional remarks</i>
Croatia	1996, 1998-1999	C&K only mention 1996, Kraft (2002) also mentions 1998-1999
Czech Republic	1993-1997	
Estonia	1992-1995	
Hungary	1991-1995	
Latvia	1995-1997	
Lithuania	1995-1996	
Poland	1991-1995	The main part of the recapitalisation program was completed by 1996.
Romania	1998-1999	Restructuring and bank liquidations continued until 1999
Slovak Republic	1996-2000	Restructuring and bank liquidations continued until 2000
Slovenia	1992-1994	