

## Are the new and old EU countries financially integrated?<sup>1</sup>

Tomas Dvorak

Department of Economics

Union College

Schenectady, NY 12308

Chris R. A. Geiregat

Department of Economics

Williams College

Williamstown, MA 01267

### Abstract

During the last four years, the eight Eastern European countries that joined the EU in 2004 have made significant strides toward financial integration with the EU. Several pieces of evidence support this finding. First, yields on long-term sovereign bonds in accession countries have converged towards EU levels. This is true for both bonds denominated in local currency and bonds denominated in euro. Second, while the issuance of euro-denominated corporate bonds from accession countries is limited, yields on existing corporate bonds are in line with those in the old EU countries. Third, margins in the banking sector have narrowed, which is consistent with the integration of banking markets. Finally, we note that the current stock market rally is consistent with equity market integration.

Key Words: financial integration, Eastern Europe, EU enlargement

JEL Codes: F020, F330, G150, P330

---

<sup>1</sup>Dvorak gratefully acknowledges financial support from the European Central Bank. Geiregat was a Visiting Scholar at the IMF Institute when this paper was written. The Institute's support is greatly acknowledged.

# 1 Introduction

The recent enlargement of the European Union is a historic step towards economic and political integration in Europe. One way EU enlargement could benefit the accession countries is through the integration of financial markets. Integrated financial markets should facilitate greater risk sharing and product specialization and a more efficient allocation of capital. In addition, financial integration should effectively provide greater financial development for accession countries since it facilitates access to the more developed financial markets of the old EU members. Although controversial, there is evidence that international financial integration leads to economic growth (for recent survey see Edison et al. (2004)). At least two studies find that financial integration among the old EU members leads to higher growth (Guiso et al. (2004), London Economics (2002)). There is also convincing evidence that financial development leads to growth (for a recent and comprehensive survey see Levine (2004)). The purpose of this paper is twofold: to assess the degree of financial integration of the new members with the EU; and to determine how the degree of financial integration evolved during the years prior to the formal accession in 2004.

Understanding the degree of financial integration is important for at least two reasons. First, it helps us to evaluate the benefits of the recent EU enlargement. We investigate how financial integration has progressed in recent years and how changes in laws and regulations made prior to the accession contributed to integration. Second, the degree of financial integration is relevant to each country's decision regarding the adoption of the Euro. There is growing evidence that a common currency contributes to financial integration (Sentana (2002), Hardouvelis, Malliaropulos and Priestley (2004) and (2002), Galati and Tsatsaronis (2001), Fratzscher (2002)). If the current level of integration is inadequate, perhaps a common currency would deliver both full integration and its associated benefits. In addition, in order for monetary policy to function properly in a common currency area, financial markets should be integrated. When financial markets are integrated, any one economy can absorb asymmetric shocks more easily (De Grauwe (2000) p. 219). Therefore, the extent to which financial markets in the new member states are integrated should affect the timing of the adoption of the euro.

Our measures of financial integration are driven by the desire to capture the benefits of integration.<sup>2</sup> Specifically, we attempt to measure two aspects of financial integration: changes in the cost of capital, and changes in access to the more developed EU markets. The first set of measures

---

<sup>2</sup>There is a wide range of measures of financial integration used in the literature (for a survey see Adam et al (2002)).

designed to capture the changes in the cost of capital. We compare yields and interest rates in accession countries to those in the old EU. Financial market integration should bring these closer together. This measure of integration is an application of the law of one price, which should hold in financially integrated markets. Since accession countries are capital poor and generally expected to grow faster than the old EU countries, financial integration should lead to a reduction in yields and hence a lower cost of capital. In equity markets we investigate whether future dividends are discounted by world factors rather than local factors. Since individual stocks are less risky to a world investor than to a local investor, the equity cost of capital should also fall as financial integration increases. The second set of measures is designed to determine access of individuals and firms to the more developed financial markets. In particular, we document the number of corporate and sovereign euro-bond issues and of equity cross-listings. In addition, we present evidence on changes in the efficiency of the banking sector. We view increased competition and the resulting increase in efficiency as a form of financial integration. This is particularly relevant in accession countries where the banking sector had previously been dominated by large state owned or formerly state owned banks.

We examine financial integration in five markets: money, government bonds, corporate bonds, loans and equity markets. By covering the entire financial sector we gain breadth, but inevitably sacrifice some depth. This choice is deliberate as our goal is to provide an overall assessment of financial integration and how it has changed in recent years. Our structure also complements the existing work on financial integration among the old EU countries, particularly that of Baele et al. (2004). Since we calculate some of the same measures of integration for accession countries as Baele et al. (2004) did for EMU countries, a comparison of the degree of financial integration within EMU and between EMU and accession countries is easily made. We also focus on the eight Eastern European new members: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. We do not consider Malta and Cyprus which also became members in 2004.

The literature on financial integration among the old EU members is considerable (see for example Adam et. al (2002) and Baele et al. (2004) and references therein). The work on financial integration of accession countries, however, is limited. Caviglia, Krause and Thimann (2002) survey the financial sector in accession countries. They find that as of 2001, the size and efficiency of the financial sector in accession countries is low relative to the EU. They point out the high degree of foreign involvement in the banking sector, but they do not attempt to measure the degree of financial integration or how financial integration has progressed in recent years. Similarly, Dickinson and Mulleneux (2001)

assess the relative level of financial development but do not measure financial integration or how it has changed. A number of papers also examine the efficiency of the banking sector in transition economies and the role of foreign ownership (for example Bonin, Hasan and Wachtel (2003), Fries and Taci (2004)). Most recently, Guiso et al (2004) include Eastern Europe in their estimate of the effect of raising the level of financial development. They find that raising financial development to U.S. or EU level leads to an increase in growth of about half a percentage point.

## 2 Money Market

Central banks have a monopoly on issuing local money and therefore any degree of financial integration will not, in the absence of common monetary policy, lead to a convergence in money market interest rates. Nonetheless, it is worthwhile to see how short-term interest rates in the accession countries compare to those in the old EU. Once the new members adopt the euro, they will face only one money market interest rate. In EMU countries, money market interest rates started to converge about three years prior to the euro launch (Baele et al. (2004)). In addition, since short-term interest rates are indicators of monetary policy, it may be useful to see how these are correlated with European short-term interest rates. This correlation would measure the extent to which monetary policies in the accession countries are synchronized with those of the ECB.

Figure 1 plots the overnight interbank unsecured interest rates minus the overnight interbank interest rate in the euro money market (EONIA). The data is not available for Estonia. In 2001, three years before accession, short-term interest rates in the accession countries relative to EONIA ranged from two percentage points lower for Lithuania to 15 percentage points higher for Poland. The dispersion among the accession countries is much lower in 2004. It ranges from about half a percentage point lower to four percentage points higher. Hungary is an exception, with short-term interest rates about 10 percentage points higher than EONIA. Hungary has recently had the highest inflation and has faced pressure on its exchange rate. In addition, it has both high budget and current account deficits. Table I shows the correlation matrix of overnight interest rates. The table indicates that there is very little correlation between EONIA and overnight rates in the accession countries. With the exception of Poland and the Czech Republic, these correlations are negative. Moreover, the correlations among the accession countries themselves are generally low, indicating that monetary policies are not synchronized. One explanation for this finding is unsynchronized business cycles. De Grauwe (2003) p.105 reports generally low correlations between supply shocks

in the accession countries and supply shocks in the Euro area. Low correlation of monetary policy in accession and euro countries suggests that giving up independent monetary policy may be relatively costly for the accession countries.<sup>3</sup>

### 3 Government Bond Markets

When bonds are issued in the same currency and financial markets are integrated, the yield spread on domestic bonds relative to foreign bonds ( $i - i^*$ ) should reflect credit risk ( $\rho$ ). The credit risk premium,  $\rho$ , may include not only the probability of default but also differences in liquidity:

$$i = i^* + \rho \tag{1}$$

Previous studies on European financial integration in the government bond market look at the convergence in yields on 10-year government bonds (for a short survey see Baele et al. (2004) p. 36-37). To the extent that sovereign credit risks in EU countries are very similar, yields should also be similar. Indeed, there had been dramatic convergence in yields among the EMU countries prior to the launch of the Euro. The spreads went from about seven percentage points relative to Germany in 1995 to only tens of basis points at the beginning of 1999. This dramatic convergence in yields is viewed partly as evidence of convergence in underlying fundamentals and partly as evidence of financial integration.

When bonds are issued in different currencies, the nominal yield spread on domestic bonds relative to foreign bonds ( $i - i^*$ ) can be written as the sum of expected depreciation of the local currency ( $\varepsilon^e$ ), exchange rate risk ( $\rho^e$ ) and credit risk ( $\rho$ ):

$$i - i^* = \varepsilon^e + \rho^e + \rho \tag{2}$$

Thus, holders of a domestic bond require extra compensation for three things: the expected depreciation of the currency in which the bond is denominated; the risk associated with the future exchange rate; and the credit risk. Therefore, yield spreads relative to Germany for the accession countries will reflect exchange rate expectations and credit risks as well as the degree of financial market integration.

---

<sup>3</sup>The adoption of the euro is still some years away. The earliest adopters of the euro could be Estonia, Slovenia and Lithuania in 2006. These three countries joined the EMU II in July 2004 and must stay in the system for a minimum of 2 years before adopting the common currency.

Figure 2 shows the spreads for the eight accession countries. The spreads are the differences between yields on 10-year government bonds denominated in local currency and the yield on 10-year German government bond. The data comes from the ECB which publishes these yields as long-term interest rates for the purposes of evaluating convergence. The figure is strikingly similar to that for EMU members prior to the launch of the euro (see chart 8 in Baele et al. (2004)). There is a considerable degree of convergence in long-term interest rates among the accession countries. In 2001 the spreads range from two to six percentage points. With the exception of Poland and Hungary, the yields converge to less than one percentage point in 2004. Even for Poland and Hungary, the spreads had been narrowing until mid-2003. Concerns about rising public debt in those two countries were probably the reasons for the increase in spreads since mid-2003. The general narrowing of spreads in local currency denominated yields could reflect a combination of four factors: changes in expected depreciation of local currencies, lower exchange rate risk, lower credit risk, and the integration of financial markets. In the next few paragraphs we will attempt to assess the contribution of each of these factors.

It is difficult to evaluate a currency's expected depreciation without survey data on exchange rate expectations. Since we do not have this data, we present data on actual depreciations. Our objective is to see broad trends in the exchange rates. If markets form expectations from past data, the trends could give us an idea of markets' expectations. We calculate average monthly depreciations in the exchange rate with respect to the euro from 1999 to 2001 and from 2002 to 2004. The results are presented in Table II.<sup>4</sup> We see that the average depreciation in the first period is no higher than average depreciation in the second period. The differences between depreciations in the first and second periods are mostly insignificant. Only in the case of Lithuania is the difference significant, and in this case it is the *second* period which has higher depreciation than the first. This indicates that if markets expected lower depreciation, it is not based on a trend towards lower depreciations. Table II also shows the standard deviation of monthly depreciations during the two periods. With the exception of Hungary, the volatility of exchange rate is lower but the difference is statistically significant only in Lithuania and Slovenia. Since there is no marked drop in exchange rate volatility, it is difficult to argue that spreads on government bonds decreased because of a lower exchange rate risk.

Another way to quantify expected depreciation and exchange rate risk is to examine yield spreads

---

<sup>4</sup>A more sophisticated method would be to estimate a forecast model and to use the forecasts as expected exchange rates. However, such an exercise is beyond the scope of this paper.

on euro (rather than local currency) denominated bonds issued by accession countries. Unfortunately, the number of long-term euro-denominated bonds issued by the eight accession countries is limited. Estonia has issued only one euro-denominated bond, one which has 5-year maturity. The Czech Republic issued its first euro-denominated bond in June 2004. Even countries that did issue 10-year euro-denominated bonds did so infrequently, making it difficult to construct a time series of yields on long-term euro-denominated bonds. For example, Slovakia issued its only 10-year bond in 2000. We collected data on yields of all 10-year euro-denominated bonds issued by the accession countries. As a benchmark yield for each bond we use yield on a 10-year German bond issued within six months of the bond from an accession country. For each country we construct a spread between the most recent accession country 10-year bond and the corresponding German bond. For example, for Poland the series begins by tracking the difference between the yield on the 10-year Polish bond issued in March 2000 and the yield on a German the 10-year bond issued in March 2000. When Poland issued a new 10-year euro-denominated bond in January 2001, the series switches to tracking the difference between the yield on that bond and the German bond issued in January 2001 until Poland issues another 10-year bond. Thus, the series tracks spreads on 10-year euro-denominated bonds as closely as possible.<sup>5</sup> The list of the (total of 14) accession country bonds and the German benchmark bond used for each bond appears in the appendix Table A.I.

Figure 3 shows that the spreads have declined from around 80 basis points in 2001 to about 30 in 2004. These spreads are comparable to some countries in the EMU. For example, Greece, Italy and Portugal have spreads around 30 basis points. Using the spread as a measure of integration, the five accession countries that issued euro-denominated bonds appear as integrated with the EU as Greece, Italy and Portugal. The spreads are especially low considering that the accession countries generally have lower credit ratings. With the exception of Slovenia, which has an S&P rating of AA-, accession countries have ratings of A- or lower. Meanwhile, Greece, the lowest rated of the old EU countries, has an A+ rating.

The decline in spreads on both local currency as well as euro-denominated debt indicates that either credit risk has declined, the debt markets became integrated or a combination of the two. We first consider credit risk. Table III shows changes in S&P ratings on long-term sovereign debt from 2001 to 2004. The first three columns shows changes in local currency ratings, thus measuring

---

<sup>5</sup>Ideally we would like to use zero coupon bonds in each case so that the differences in size and frequency of coupon payments do not distort the results. Since no accession countries issued zero coupon bonds, we also use German bonds with coupons.

credit risk of the 10-year bonds shown in Figure 2. The last three columns show changes in foreign currency ratings, thus measuring credit risk of the euro-bonds shown in Figure 3. Interestingly, while the ratings on foreign currency bonds either improved or stayed the same, the changes in local currency ratings are mixed. The local currency ratings stayed the same for Estonia, Latvia and Slovenia, improved for Lithuania and Slovakia and actually worsened for the Czech Republic, Hungary and Poland. The downgrades for the Czech Republic, Poland and Hungary were a result of high budget deficits. The downgrades for Hungary and Poland explain why the two countries stand out with higher spreads on local currency debt in Figure 2. Since local currency ratings improved for only two countries, it is difficult to argue that the narrowing of spreads on local currency debt seen in Figure 2 was a result of lower credit risk. On the other hand, foreign currency ratings improved for four out of the eight countries, justifying lower spreads on foreign currency debt.

In summary, yields on local currency government bonds in accession countries converge towards those in the old EU. It does not appear that the fall in yields is associated with lower rate of depreciation, lower exchange rate volatility or lower credit risk. This suggests that the convergence in yields is at least in part due to financial integration. This is further supported by the convergence in yield on euro-denominated government bonds.

## 4 Corporate Bond Markets

A number of large firms in accession countries have issued both euro and dollar denominated international bonds. If corporate bond markets are integrated, the yields on comparable corporate bonds from accession and old EU countries should be equal. If accession countries are moving towards greater financial integration, any differences should be getting smaller. We use data on 7 corporate bonds issued by firms in Poland, Czech Republic, Hungary and Estonia for which yields are available from Datastream. The list of these bonds as well as their credit ratings and maturities appears in Table IV. As a measure of the yield on euro-denominated corporate bonds in the old EU, we use components of the MSCI Euro Credit Corporate Index (ECCI). This index is dominated by issues from old EU countries and therefore, is a good measure of yields on corporate bonds in the old EU. In order to compare yields with similar maturities, we use the breakdown of the index by maturity. The breakdown has five categories (2 to 3 years, 3 to 5 years, 5 to 7 years, 7 to 10 years and 10 + years). We take the yield on each accession country bond and subtract the yield on the MSCI ECCI index of corresponding maturity. Unfortunately, the credit ratings of the two yields are not



comparable. This is because the accession bonds have ratings ranging from B to A+, but the ECCI index puts together bonds with S&P ratings ranging from BBB to AAA. Therefore, in presenting the difference in yields we note the credit rating of each accession country bond. We expect that the spread on the B rated bond to be higher than the spread on the A+ rated bond. Our objective at this point is not to assess the magnitude of the difference, but rather to look for trends in the differences between yields over time.

Figure 4 shows that there is no apparent trend in the difference between the yields on accession country corporate bonds and the yields on the ECCI index. As expected, the difference is largest for the B rated bond - around four percentage points. The difference is actually negative for the A+ rated bond which is the Hungarian Development Bank. It does not appear that the yields have converged in the past four years. One explanation for this is that in 2001, the yields were already at the level of yields in the old EU. In order to assess the magnitude of the difference between the yields on accession country bonds and bonds issued in old EU countries, we need to compare yields with the same credit rating. The credit rating breakdown of the MSCI ECCI has 4 categories: BBB, A, AA and AAA. While this gives us the yields in different credit brackets, it does not distinguish between different maturities. The average maturity of the ECCI index is between four and five years. Thus, we are able to assess the magnitude of the difference only when the maturity of the accession country bond is between four and five years. We compare yields on five of the seven bonds. Of the two excluded bonds, one is B rated for which we do not have corresponding ECCI index, the other bond has only been issued recently and hence even in August 2004 has a maturity of more than five years. Table IV shows that for the remaining five bonds the differences are mostly negative. Yields on accession country bonds are actually *less* than yields on the ECCI index with the same credit rating.

We recognize that the set of accession country bonds that we considered is special. It contains mostly infrastructure firms which are partly government owned, and one development bank which is 100% government owned. Therefore, investors probably view these as low risk and thus price them below EU corporate bonds with the same credit rating. In some sense, the list of euro-denominated bonds is endogenous - these bonds were issued because they were expected to have low yields.

We find that the issuance of corporate bonds in the euro credit market by accession countries is limited. For example, only Poland and Estonia are represented in the MSCI ECCI index. The other accession countries have not yet issued bonds that would satisfy the criteria for being included in the MSCI ECCI index. Even for Poland, the value of the issued bonds is small. Consider that the

market value of German corporate bonds included in the ECCI is 133 times larger than the market value of Polish corporate bonds included in the ECCI. At the same time, the German GDP is only about 11 times that of Poland. Denmark, which has an economy about the size of Poland, and like Poland is not part of the EMU, has a market value of corporate bonds 5 times that of Poland. Clearly, if integration is measured by the value of issuance, accession countries are far from being integrated.

## 5 Loan Markets

In integrated banking markets, interest rates on identical products should be equal. It is difficult to test this proposition in practice because banking products are extremely heterogeneous. Interest rates on loans to different firms are not comparable unless we control for all characteristics of the loans. Unfortunately, only average interest rate data is available to us. We use average interest rates from two different sources. One source is the *International Financial Statistics (IFS)*. It contains a time series of lending and deposit interest rates from January 1999 until September 2003 for all eight accession countries and the euro area. We use this data to capture broad trends over time, while taking into account that the levels may not be fully comparable across countries. The second source of data is harmonized interest rates which were introduced by the ECB in 2003. The harmonized interest rates are compiled using consistent definitions across countries. Five accession countries began using the harmonized definitions in 2004. Thus, we use the first six months of 2004 in our calculations. The first source of data allows us to look at trends over time, while the second affords greater detail and precision at one point in time, the most recent.

Our principal measure of integration of the banking market is a set of margins on different banking products. If banking markets in accession countries are becoming more integrated with the EU, the margins should converge. Since margins are differences between two interest rates, they have the advantage of not including the effect of expected depreciation of the exchange rate. Cabral et al (2002) also use bank margins to measure integration in the euro area. Our first margin is the difference between lending and deposit rates. For this we use the *IFS* data and have time series going back to 1999. Figure 5 shows the difference between lending and deposit interest rate for the eight accession countries and for the euro area. The figure clearly shows convergence of the margins in accession and euro countries. The margin in the euro area is roughly constant at about three percentage points. The margin in accession countries dropped dramatically from as high as

11 percentage points in 1999 to less than five percentage points at the end of 2003. While narrower margins could be a result of more competition among domestic banks, they are also consistent with the integration of banking markets in the accession countries with those of the euro area. These results are also consistent with the finding of Fries and Taci (2004) who note that efficiency of the banking sector in transition countries has improved dramatically in recent years.

While the margins in Figure 5 undoubtedly show trend towards lower margins, the levels of *IFS* interest rates are not fully comparable across countries. In order to compare levels of margins we turn to harmonized interest rates. These also allow us to investigate the level of integration in different segments of the banking market. We calculate margins for overnight deposit rates by households and corporations, and for rates on loans to households and corporations, further broken down by size. The margins on overnight deposit rates are the differences between the overnight money market interest rate and the relevant overnight deposit interest rate. For short-term loans (up to one year), we calculate the margin as the difference between the interest rate on the short-term loan and the overnight money market interest rate. For medium and long-term loans, the margin is the difference between the respective loan interest rate and the yield on a 10-year government bond.

Table V shows bank margins averaged over the first six months of 2004. The last row shows the difference between the average margins in accession countries and in the euro area. In all cases margins are higher in accession countries than in the euro area. The largest difference between margins in the accession countries and those in the euro area is for consumption loans to households. While in the euro area banks charge only 2.7 percentage points over the yield on government bonds, this margin in accession countries is over 12 percentage points. The consumer loan market appears far less competitive or far less integrated than the market for corporate loans. This is quite plausible as barriers to entry to the corporate loan market are lower than those to the consumer loan market. Also, the consumer loan market may require proximity to customers whereas corporate loans are subject to foreign competition. Given the high margins in the consumer loan market, it is not surprising that a number of foreign banks have recently announced plans to enter this market (Wall Street Journal (2004)). The margins on loans to corporations are between 1.5 and 2.5 percentage points in accession countries and between -0.8 and 2 percentage points in the euro area. As one would expect, margins for large corporate loans are lower than for small corporate loans. One may also expect that large loans are more subject to foreign competition than small loans, thus erasing the difference in margins for large loans between euro area and accession countries. The last row in Table V shows that the opposite is the case. The differences between accession and euro area

margins are always lower for large than for small loans.

Another piece of evidence of banking market integration is the vast foreign ownership of banks in accession countries. Using data from BankScope, we consider 152 banks from accession countries for which we were able to determine majority ownership as of the end of 2003. Of the 152 banks, 59% were majority foreign owned. Only in Latvia and Slovenia is the percentage of banks with majority foreign ownership lower than 50%. The share of foreign ownership has increased in recent years. Unfortunately, BankScope does not provide historical data on ownership, but Keren and Gur (2002) report that in 1997 only 39% of banks in accession countries were majority foreign owned.<sup>6</sup> Foreign ownership undoubtedly facilitates financial integration. It also contributes to greater efficiency of the banking system. This is shown by Fries and Taci (2004) who find that foreign banks in transition countries tend to be the most efficient ones.

## 6 Equity Markets

### 6.1 Pricing

In integrated equity markets, future expected dividends are discounted by the same discount factor. This discount factor should be related to each stock's systematic risk. Systematic risk is measured by the co-movement of the stock's returns with the returns on the overall market portfolio. When an equity market is segmented, the discount factor is measured by the co-movement of the stock's returns with the local market portfolio. Hardouvelis, Malliaropoulos and Priestley (2004) study the importance of local and world risk factors for stock pricing in the EMU. They find that as the EMU was becoming more of a reality, world factors became more important than local factors. Estimating the partial integration asset pricing model along the lines of Hardouvelis, Malliaropoulos and Priestley is beyond the scope of this paper. However, we note that one prediction of market integration is that stock prices should rise when markets become integrated. This is because the individual stock's co-movement with the local market is likely to be much greater than its co-movement with the world market. In other words, individual stocks in accession countries are less risky to a global investor than to a local investor. This means that upon integration, risk falls and prices should rise. Henry (2000), Henry and Chari (2002) find that stock market liberalizations in Asia and Latin America in the 1990s were associated with these permanent price increases.

Figure 6 shows the behavior of stock indices in the eight accession countries. The figure shows

---

<sup>6</sup>We made this calculation using Table 1 in Keren and Gur (2002).

that stock prices increased quite dramatically after November 2001. The unweighted average return from November 2001 to July 2004 was over 90%, while the world market index returned about eight percent. Incidentally, November 2001 is when the European Commission released the timing and the list of countries involved in the EU enlargement. The fact that this dramatic increase followed the news of EU enlargement is consistent with market integration. It is possible that foreign investors began to include Eastern European stocks into their world portfolios and priced them accordingly. Of course it is also possible that the dramatic increase is related to higher expected earnings that was expected as a result of EU membership. Dvorak and Podpiera (2004) attempt to differentiate between the increase in expected earnings and re-pricing of risk as explanations for the dramatic rise in stock prices. He finds that at least part of the price increase is a result of the re-pricing of risk following market integration.

## 6.2 Correlations and country vs. industry effects

One drawback of measuring integration using asset pricing models is that it relies on the validity of the model. Financial economists typically find that returns are explained by factors other than beta (Fama and French (1992)), or have difficulty finding a proxy for market portfolio (Jagannathan and Wang (1996)). Hence, testing for integration using a specific asset pricing model becomes the joint test of the model and market integration. If the asset pricing model is not valid, then our inferences about the degree of integration are not valid.

Baele et al (2004) propose a measure of integration which relies on the degree of co-movement among returns. They argue that in integrated markets, returns should move together. It is important to point out that co-movement of returns measures *product* market integration rather than *capital* market integration. If prices reflect future profits, returns should be correlated only if the profitability of firms is correlated. For example, the profitability of Czech and German firms will be correlated if German and Czech firms face similar business conditions. This will happen when the product markets are integrated, i.e. when Czech and German firms sell their products to the same market. Even if correlations of returns do not measure the integration of capital markets, they are important for evaluating the diversification benefits of investing in accession countries.<sup>7</sup>

Figure 6 shows visually that the correlations of Eastern European market indices with either world or European indices are small. While Eastern European markets soared after 2001, the world

---

<sup>7</sup>Goetzmann, Li and Rouwenhorst (2001) find that correlations in international stock market returns have increased over the last several years. They attribute this development to increased trade and general economic integration.

and European markets remained roughly constant. In fact, correlations with the world index for the 1999 to 2004 time period are negative for six of the eight countries. Whether the correlations will remain negative or generally low in the future is unlikely. It is possible that the most recent period is a transition from segmented to integrated markets and is thus inappropriate for evaluating long run correlations. For this longer time series may be necessary.

The low correlation between local stock markets and the European and world indices could be driven in part by a different industrial structure. For example, the Czech stock market may not co-move with the European one partly because the Czech market is dominated by energy and telecom firms. If the energy and telecom industries perform poorly, the whole Czech market will perform poorly. Heston and Rouwenhorst (1994) explore to what extent the lack of correlation among country indices is driven by differences in industrial structure. Rouwenhorst (1999) examines whether returns in European firms are more driven by the country in which the firm is headquartered, or by the industry to which the firm belongs. Using data up to 1998, he found that country effects were larger than industry effects, despite the convergence in European interest rates and fiscal policies in the 1990s.

We follow Rouwenhorst's methodology and estimate country and industry effects for European firms including the new EU members. The data on returns and market capitalization comes from IBES. We also use the IBES broad industry classification. We have data on 3,368 firms in 11 EMU countries (we consolidated Luxembourg and Belgium), five non-EMU old EU members and three accession countries (Czech Republic, Poland and Hungary). Unfortunately the firm-level data for the five other accession countries lack a sufficient number of observations. Table VI shows the value weighted average monthly return, the average standard deviation of the return, and the number of firms for each country and industry. We have data from March 1999 until April 2004. Each month we take the cross section of firms and regress monthly returns on country and industry dummies. Since there is perfect multicollinearity between the two sets of dummies and the constant term, we restrict the weighted sum of the coefficients on industry dummies to be equal to zero. The weights are the industry shares in the total European index in that month. We impose analogous restrictions on the coefficients on country dummies. This means that the estimated country and industry effects can be interpreted as performance in excess of the European value-weighted index. For more on this methodology see Rouwenhorst (1999).

Table VII shows the average of the estimated country and industry effects. By construction, the average industry and country effects across all countries and industries are zero. Accession countries

have a positive average effect of about one percent. This means that on average they outperformed the European index by one percent a month. Clearly this is driven by the extraordinary performance of the Eastern European markets since 2001. In order to evaluate the importance of country and industry for returns we calculate the average of absolute value effects for each country and industry and then average these using average market capitalization as weights. We find that average absolute country effects are only slightly higher than average absolute industry effects. Interestingly, the EMU or non-EMU country effects are lower than the industry effects. This is the opposite of what Rouwenhorst found in 1998. The greater importance of industry relative to country in determination of returns could be driven by further integration of the EMU countries since 1998. This trend is also reported by Adjaoune and Danthine (2003) and Baele et al. (2004) who find that after 1999, the dispersion of sector returns is bigger than the dispersion of country returns.<sup>8</sup>

The average absolute effect for accession countries is about five percent per month. This means that investing in accession countries in industries that reflect the European index, yields returns that are on average five percentage points per month different than investing in the European index. The tracking error of accession countries relative to the European index is five percent per month even if we control for the differences in industrial structure. Note that the tracking error would likely be even higher if we included the other five accession countries. The three countries that we did include are more correlated with world or European indices than those which we excluded due to data limitations. The absolute accession country effect is also three percentage points higher than the absolute industry effect. This means that for firms in accession countries, the importance of country is greater than the particular industry in which they operate. Figure 7 shows seven month trailing moving average of the absolute effects. We see that the accession effect is consistently higher than industry, EMU or non-EMU effects. There is no apparent trend for the accession effect to decline. The implication is that significant diversification benefits exist when accession countries are included in a portfolio. While for the old EU members industry allocation is as important as country allocation, when accession countries are included country allocation is more important.

### 6.3 Cross listings

One way firms in the accession countries tap foreign capital markets is by listing their shares on foreign exchanges. It is unclear whether foreign listing is evidence of market integration or of market segmentation. On the one hand, foreign listing means that foreign investors trade Eastern European

---

<sup>8</sup>Indeed, Rouwenhorst's website shows that in 2000 industry effects became larger than country effects.

shares. This certainly contributes to integration since foreign participation provides both capital and the desired risk sharing. It likely leads to share pricing according to world rather than local risk factors. On the other hand, if stock markets were perfectly integrated there would be no need for cross listing. For example, French firms have no need to list their shares in Amsterdam since Paris and Amsterdam are one exchange. We view cross listings as the first step to complete financial integration. Foreign listing means that a firm utilizes local as well as foreign sources of capital, which is consistent with financial integration. However, we recognize that the inability or unwillingness of foreigners to participate in local markets (without cross listing) is evidence of market segmentation which may be due to different clearing systems, segmented custody, etc.

Figure 8 shows the number of Eastern European cross listings. The first cross listing occurred in 1992 (Hungary's retailer Fotex issued the first ADR), but cross listings really took off in 1997. In 2004 there are over 100 Eastern European cross listings. The number of cross listings does not equal the number of firms that list their shares abroad. The reason is that many firms list their shares on more than one foreign exchange and are thus double or triple counted in the total number of cross listings. For example, Czech Republic's largest bank, Komerčni, has an ADR and is listed both in London and Frankfurt. The list of the 71 firms that cross list their shares and effective dates of their cross listing is in Table A.II in the appendix. The top panel a in Figure 8 shows how the cross listings are distributed among London, Frankfurt and New York. It is important to note that the number of listed firms says nothing about the volume of trades. In many cases the liquidity of these cross listings is questionable. For example, only one firm from the eight accession countries, Hungarian Matav, is listed on the New York stock exchange, while the rest are traded over the counter with unknown traded volume. Deutsche Borse has established a new segment of the market called Newex - both through its electronic platform Xetra as well as on the trading floor in Frankfurt. At this point, no Eastern European firms trade on Euronext, although a number of funds that invest in Eastern Europe are listed there. The bottom panel of Figure 8 shows the the number of cross listings for each country. As expected, the largest and oldest markets of Poland, Hungary and the Czech Republic dominate the cross listings.

## 7 Conclusion

During the last several years, the eight Eastern European accession countries have made significant strides towards financial integration with the EU. Both short and long-term local currency interest



rates have converged towards EU levels. Those countries that issued euro-denominated bonds now face spreads comparable to those among the old EU countries. While the number of international corporate bond issues is limited, the yields are in line with those in the old EU. The banking sector is now dominated by foreign banks and efficiency has improved dramatically. The continuing stock market rally in the region is consistent with financial integration into the EU.

The progress towards financial integration inevitably lowered the cost of capital in the accession countries. While in 2001 government debt in accession countries yielded two to six percentage points over German yield, for most countries this has been reduced to less than 1 percentage point even though the rates of inflation and exchange rate depreciation have been left unchanged. Therefore, the real cost of government debt fell substantially. This is also evident in spreads on euro-denominated government debt which fell about 50 basis points between 2000 and 2004. The cost of retail borrowing fell as well. While in 1999 the spread between lending and deposit rates was nearly seven percentage points, by 2004 it declined to less than four - roughly the EU level. The one segment of the retail market where substantial progress has not been made is consumption loans by household. These face margins far above the EU level. Another area where integration is lagging is the the access to euro-denominated corporate bonds. As of now, the value of bonds issued is relatively small. On the other hand, the stock market rally spurred a number of IPOs.<sup>9</sup>

In part we view the progress towards financial integration and the associated decrease in the cost of capital as benefits of EU enlargement. These benefits add to the already recognized benefits of greater product and labor market integration, and to the benefits of political integration. There is a question as to whether financial integration would have occurred regardless of EU membership. While we do not have a definitive answer to this question we note that prospects of EU membership lead to numerous changes in laws in accession countries. These changes are detailed in annual reports of progress towards accession.<sup>10</sup> In addition, foreign investors view EU membership as a stamp of stability. Articles in business press often mention EU membership when describing opportunities in accession countries (for example see Wall Street Journal (2004b)). Finally, even a cursory look at the experience of countries that are not working towards EU membership indicates that they are far less financially integrated than the accession countries. To a large extent the causality goes both ways: only countries with some degree of integration apply for EU membership, but EU membership gives further impetus to integration.

---

<sup>9</sup>In June 2004 the Czech stock market had its first IPO in 10 years. In May 2004 Latvia had its first private sector IPO since 1997.

<sup>10</sup>These reports are available at <http://europa.eu.int/comm/enlargement/docs/index.htm>

The evidence also shows that the progress towards lower spreads is not irreversible. Both Poland and Hungary had converging spreads until mid 2003 when the fiscal situation in both countries deteriorated. Since then the spreads widened. This indicates that financial integration has to be accompanied by sound fundamentals. We also note that the progress towards financial integration documented in this paper occurred without membership in the common currency area. While it is expected that EMU membership will lead to further integration, a great deal of integration has already been achieved.

## References:

Adam, Klaus, Tullio Jappelli, Annamaria Menichini, Mario Padula and Marco Pagano, 2002, Analyse, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union, Centre for Studies in Economics and Finance, Department of Economics and Statistics, University of Salerno.

Adjoune, Kpate and Jean-Pierre Danthine, 2003, European Financial Integration and Equity Returns: A Theory-Based Assessment in Gaspar V et al. eds. *The Transformation of the European Financial System*, ECB.

Baele, Lieven, Annalisa Ferrando, Peter Hordahl, Elizaveta Krylova and Cyril Monnet, 2004, Measuring Financial Integration in the Euro Area, Occasional Paper Series no. 14, European Central Bank.

Bonin, John P., Inftekhar Hasan, Paul Wachtel, 2003, Bank Performance, Efficiency and Ownership in Transition Countries, mimeo.

Cabral Ines, Frank Dierick and Jukka Vesala, 2002, Banking Integration in the Euro Area, ECB Occasional Paper Series no. 6.

Caviglia, Giacomo, Gerhard Krause and Christian Thimann, 2002, Key features of the financial sectors in EU accession countries, in *Financial Sectors in EU Accession Countries* Christian Thimann Ed., ECB.

Chari, Anusha and Peter Blair Henry, 2004, Risk Sharing and Asset Prices: Evidence From a Natural Experiment, *Journal of Finance* 59 (2), 1295-1324.

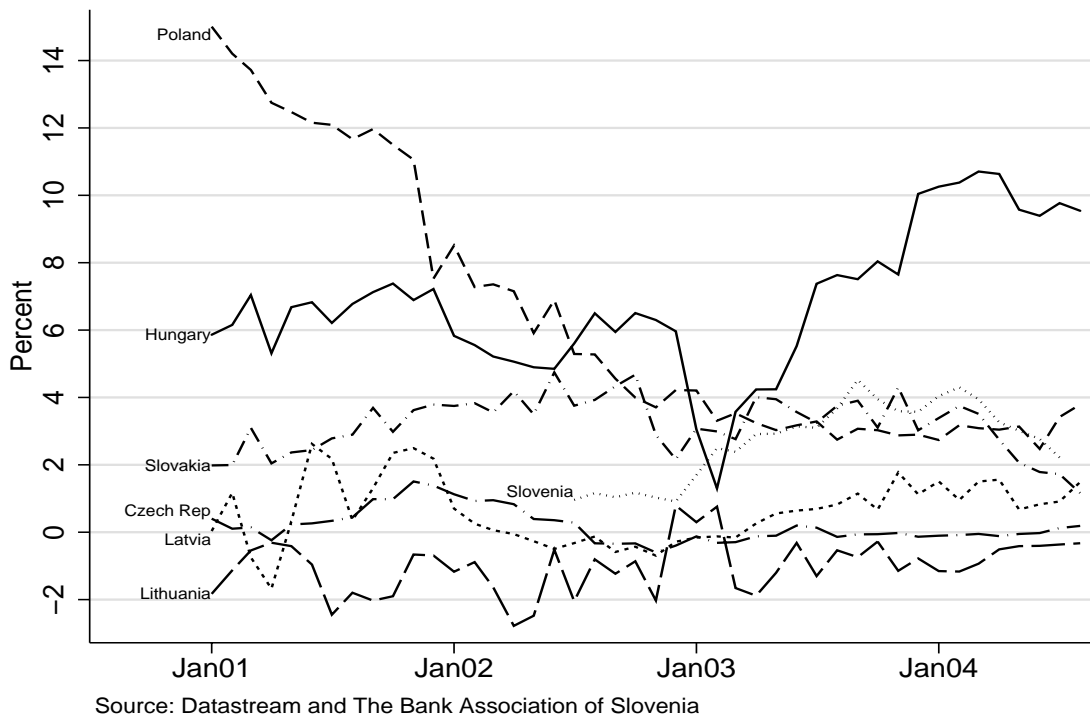
Dickinson, David G. and Andrew W. Mullineux, 2001, Financial integration between the EU and the economies of Central and Eastern Europe: an overview, in *Financial and Monetary Integration in the New Europe: Convergence Between the EU and Central and Eastern Europe* David G. Dickinson and Andrew W. Mullineux Eds. Edward Elgar, Cheltenham, UK.

Dvorak, Tomas and Richard Podpiera, 2004, European Union Enlargement and Equity Markets in Accession Countries, mimeo.

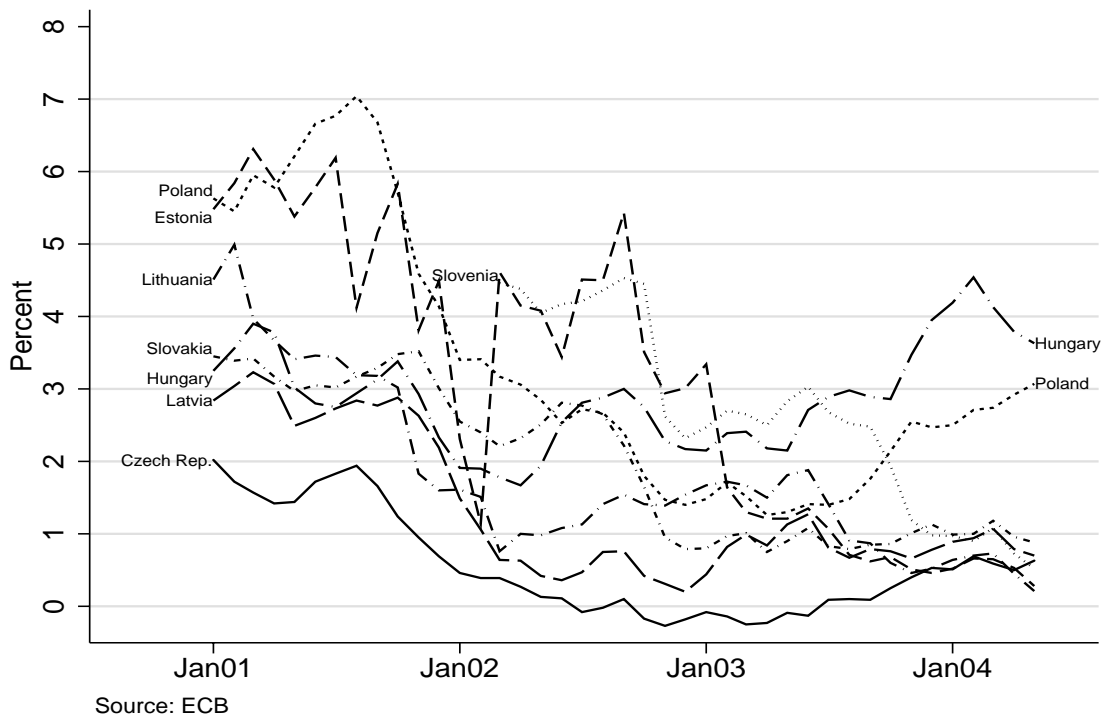
Fries, Steven and Anita Taci, 2004, Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries, EBRD Working Paper no. 86.

De Grauwe, Paul, 2000, Economics of Monetary Union (4th ed.), Oxford University Press.

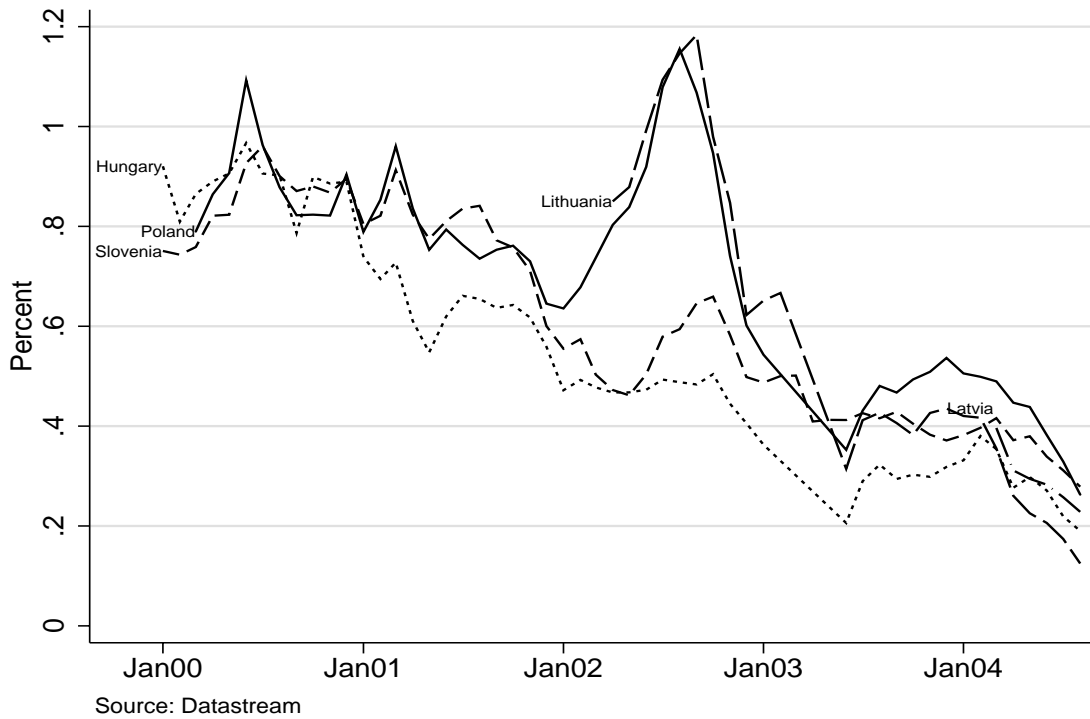
- De Grauwe, Paul, 2003, The Euro at Stake? The Monetary Union in an Enlarged Europe, *CES ifo Economic Studies* 49(1), 101-121.
- Guiso Luigi, Tullio Jappelli, Mario Padula and Marco Pagano, 2004, Financial Market Integration and Economic Growth in the EU, CEPR discussion paper no 4395.
- Fama, Eugene F. and Kenneth R. French, 1992, The cross-section of expected stock returns, *Journal of Finance* 47, 427-466.
- Fratzscher, Marcel, 2002, Financial Market Integration in Europe: On the Effects of EMU on Stock Markets, *International Journal of Finance and Economics* 7(3), 165-193.
- Galati, Gagielle and Kostas Tsatsaronis, 2001, The impact of the Euro on the Europe's Financial Markets, BIS Working Paper No. 100.
- Goetzmann, William N., Lingfeng Li and K. Geert Rouwenhorst, 2001, Long-Term Global Market Correlations, NBER Working Paper no. 8612.
- Hardouvelis, Gikas A., Dimitrios Malliaropulos and Richard Priestley, 2004, EMU and European Stock Market Integration, mimeo.
- Heston, Steven L. and K Geert Rouwenhorst, 1994, Does Industrial Structure Explain the Benefits of International Diversification?, *Journal of Financial Economics* 36, 3-27.
- Jagannathan, Ravi and Zhenyu Wang, 1996, The Conditional CAPM and the cross-section of expected returns, *Journal of Finance* 51(1), 3-53.
- Keren, Michael and Ofer Gur, 2002, Globalization and the Role of Foreign Banks in Economies in Transition, mimeo.
- Levine, Ross, 2004, Finance and Growth in Philippe Aghion and Steven Durlauf Eds. *Handbook Of Economic Growth*.
- Rouwenhorst, K. Geert, 1999, European Equity Markets and the EMU, *Financial Analysts Journal* 55, 57-64.
- Sentana, Enrique, 2002, Did EMS reduce the cost of capital?, *The Economic Journal* 112, 786-809.
- Wall Street Journal, 2004a, GE Banks on Emerging Markets, page C1, August 24.
- Wall Street Journal, 2004b, Going Global: EU's Newcomers Get Respect; Despite Skeptics, Some Strategists See Upside in New Members, page C16, June 23.



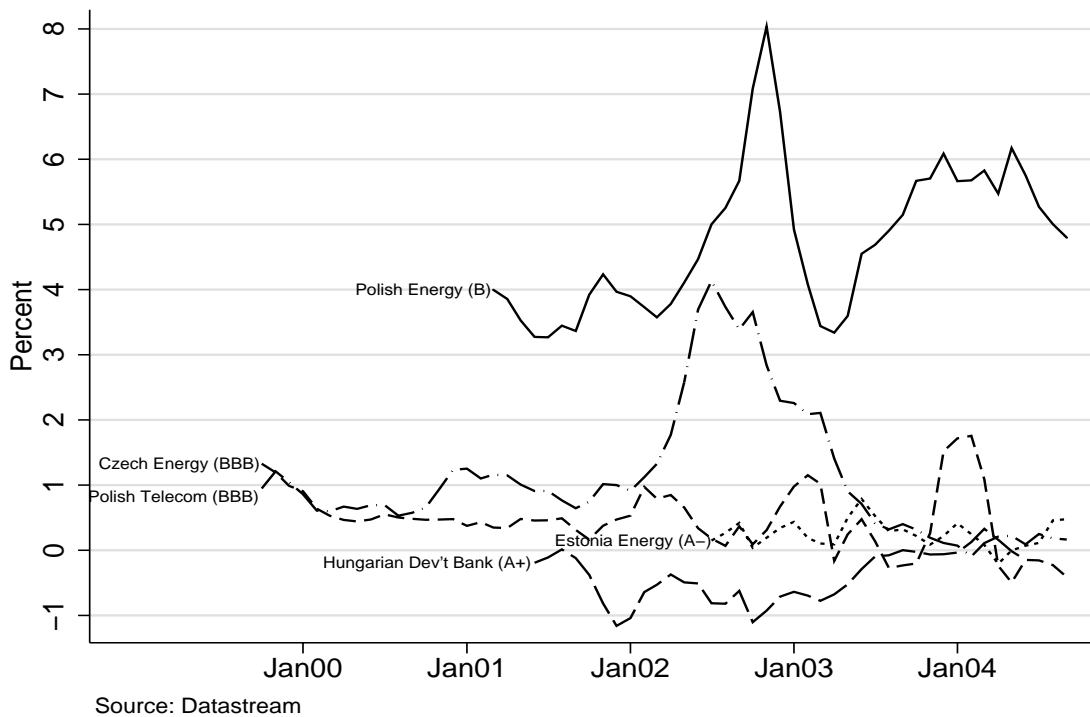
**Figure 1. Overnight interest rates relative to EONIA.** The graph shows the difference between overnight inter-bank unsecured interest rates in respective countries and EONIA.



**Figure 2. Yield spread on 10-year local currency denominated government bonds relative to Germany.** The graph shows the difference between yields on 10-year government bonds in respective countries and the yield on a 10-year German government bond.

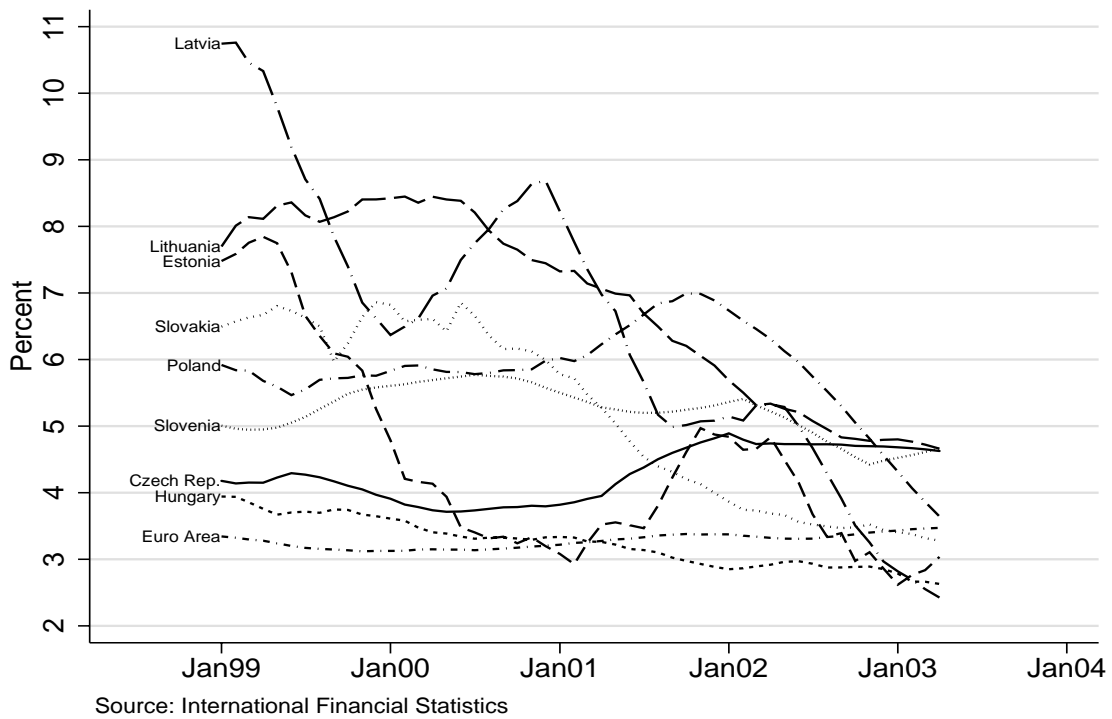


**Figure 3. Yield spread on 10-year euro-denominated government debt relative to Germany.** The graph shows the difference between the most recent 10-year euro-denominated accession country bond and the German 10-year bond issued within 6 months of the accession country bond.

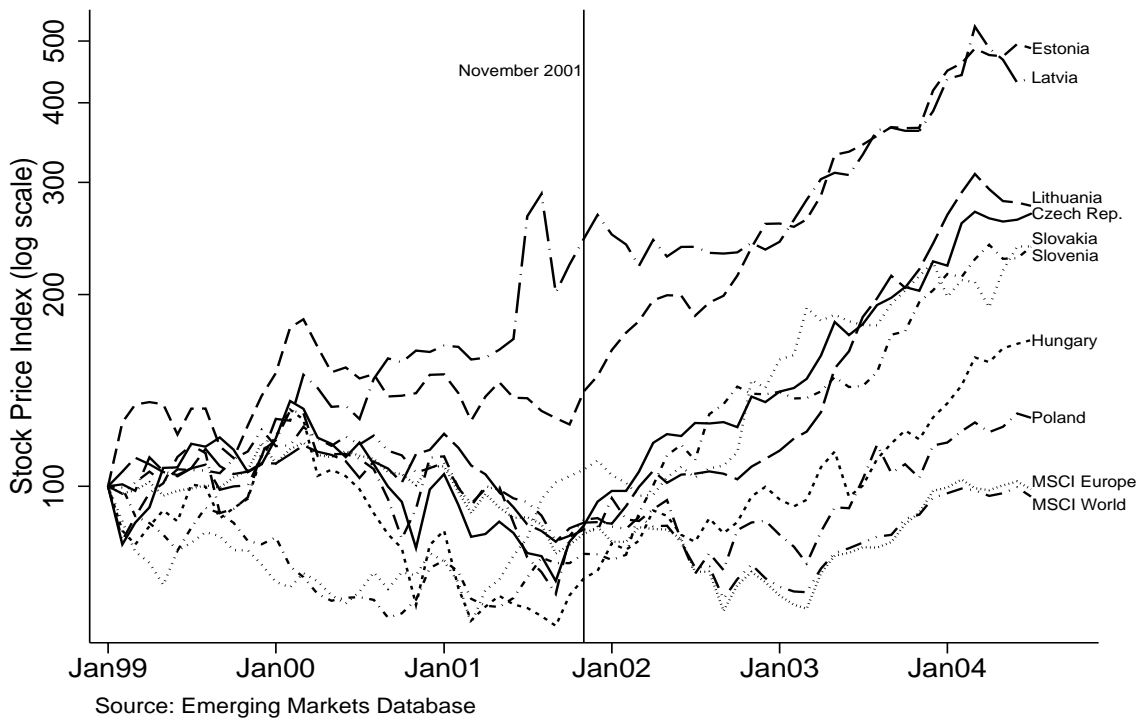


**Figure 4. Yields on euro-denominated corporate bonds from accession countries relative to the MSCI ECCI index.** The graph shows the difference between the yield on accession country corporate bonds and the yield on the MSCI ECCI index. The MSCI ECCI index used for each bond at each point in time corresponds to the remaining maturity of the corporate bond.

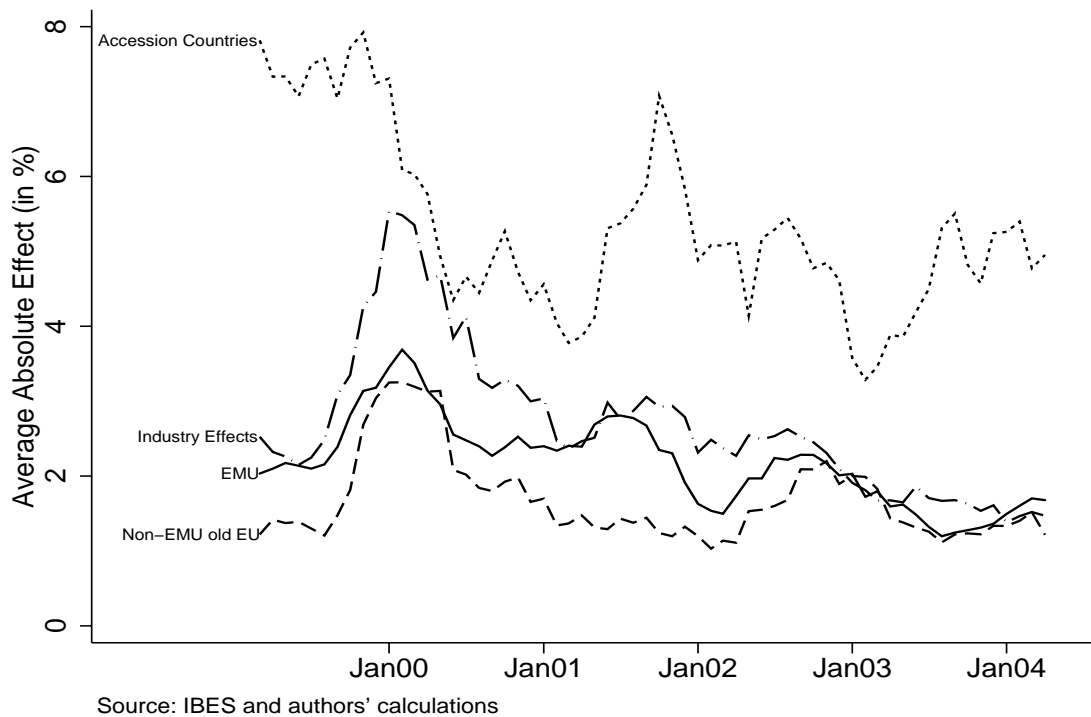




**Figure 5. Lending minus deposit rates in the accession countries and the euro area.** The IFS code for lending and deposit rates are 60l and 60p respectively.



**Figure 6. Stock market indices in accession countries.** Total return indices from the Emerging Markets Database for each country are scaled to equal 100 in January 1999.



**Figure 7. Average absolute country and industry effects.** The graph shows 7 month trailing moving average of the average absolute effects. Country and industry effects are estimated by regressing the cross section of monthly returns of 3884 European firms each month on country and industry dummies. The coefficients on each set of dummies are restricted to have the value weighted sum equal to zero. Average absolute effect is calculated as the weighted average of the absolute values of the estimated effects.

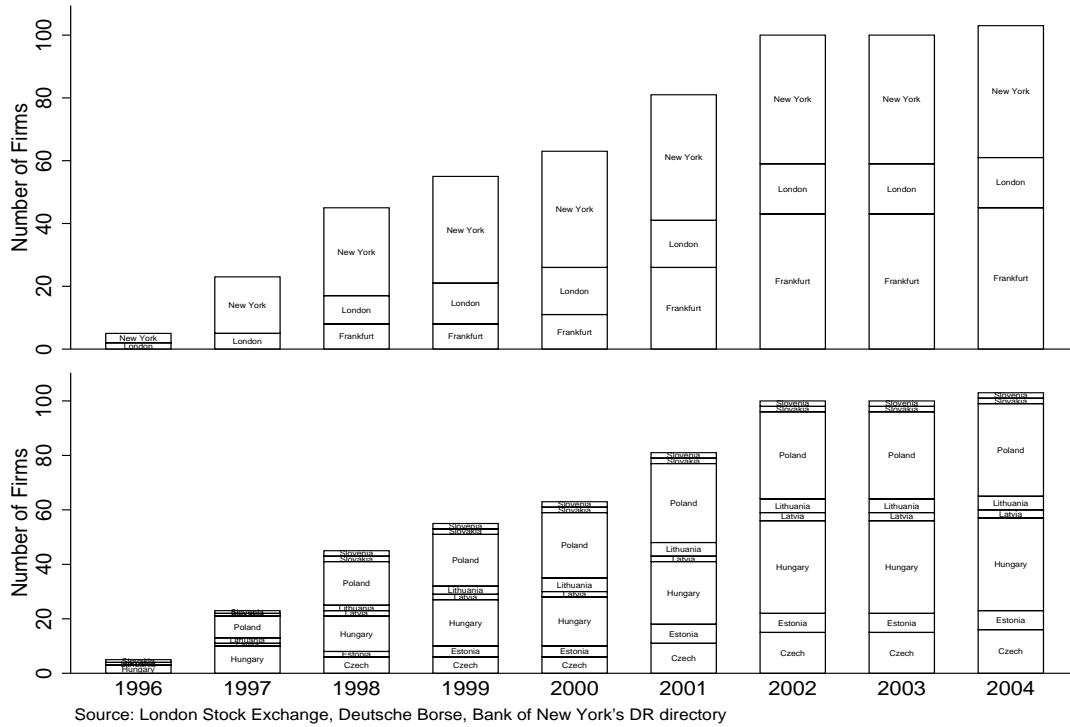


Figure 8. The number of Eastern European firms cross-listed on exchanges abroad by foreign exchanges.

**Table I**  
**Correlations Between Overnight Interest Rates**

We use monthly data from January 2001 through August 2004. All data is from Datastream except for Slovenia which is from the Bank Association of Slovenia.

country	EONIA	Czech R.	Hungary	Latvia	Lithuania	Poland	Slovakia
EONIA	1						
Czech Republic	0.30	1					
Hungary	-0.39	-0.04	1				
Latvia	-0.18	0.41	0.49	1			
Lithuania	-0.27	-0.31	0.07	-0.06	1		
Poland	0.93	0.50	-0.20	0.06	-0.27	1	
Slovakia	-0.15	0.15	-0.24	-0.09	-0.27	-0.22	1
Slovenia	-0.90	0.41	0.49	0.85	0.01	-0.81	0.04

**Table II**  
**Average Depreciation and Exchange Rate Volatility**

Monthly depreciation is the log of the end of the month's exchange rate minus the log of the end of the previous month's exchange rate. The exchange rate is the price of the euro in terms of local currency. The source of the data is Datastream. 1999-2001 includes 36 monthly observations. 2002-2004 includes 30 monthly observations (up to June 2004). A \* indicates that the difference is statistically significant at the 5% level. A t-test is used for differences in monthly depreciation; an F-test is used for the differences in standard deviations.

Country	Average Monthly Depreciation			Standard Deviation		
	1999-2001	2002-2004	diff.	1999-2001	2002-2004	diff.
Czech Republic	-0.269	-0.029	0.239	1.65	1.65	-0.00
Estonia	0.002	-0.001	-0.003	0.07	0.05	-0.02
Hungary	-0.057	0.043	0.100	1.49	1.92	0.43
Latvia	-0.486	0.546	1.032*	1.84	1.52	-0.32
Lithuania	-0.781	-0.067	0.715	2.72	0.35	-2.36*
Poland	-0.400	0.720	1.120	3.01	2.56	-0.45
Slovakia	-0.022	-0.203	-0.181	1.49	1.33	-0.16
Slovenia	0.376	0.290	-0.086	0.55	0.36	-0.19*

**Table III**  
**Changes in S&P Credit Ratings**

The data comes from S&P, which provides a history of all credit rating actions. The change in credit rating is measured in the number of categories between the current rating and the previous one.

Country	Local Currency			Foreign Currency		
	2001	2004	change	2001	2004	change
Czech Republic	AA-	A+	-1	A-	A-	0
Estonia	A-	A-	0	BBB+	A-	1
Hungary	A+	A	-1	A-	A-	0
Latvia	A-	A-	0	BBB	BBB+	1
Lithuania	BBB+	A-	1	BBB-	A-	3
Poland	A+	A-	-2	BBB+	BBB+	0
Slovakia	BBB+	A-	1	BB+	BBB+	3
Slovenia	AA	AA	0	A	AA-	2

**Table IV**  
**The Difference Between Yields on Corporate Bonds**

The table shows the difference between the yield on accession country euro-denominated corporate bonds and the yield on the MSCI ECCI index of corresponding credit rating. The yields are compared during the period when the bond's remaining maturity is between 5 and 4 years. This corresponds to the average maturity of the MSCI ECCI index. The period in the table is the time period when the corporate bond had maturity between 5 and 4 years. This is the period during which the yields on bond and the ECCI index are compared.

Bond	Country	Maturity	Rating	Period	Bond Yield	ECCI Yield	Diff.
CEZ	Czech Rep.	10/2006	BBB	10/01-9/02	5.87	6.27	-0.39
Hungarian Dev't Bank	Hungary	6/2006	A+	6/01-5/02	4.93	5.50	-0.57
Eesti Energija	Estonia	7/2009	A-	7/04-9/04	4.12	4.16	-0.04
TPSA 1999	Poland	10/2004	BBB	10/99-9/00	6.27	6.32	-0.05
TPSA 2000	Poland	3/2007	BBB	3/02-2/03	7.89	6.07	1.82
TPSA 2004	Poland	7/2011	BBB	7/06-6/07	n.a.	n.a.	n.a.
Electrownia Turow	Poland	3/2011	B	3/06-2/07	n.a.	n.a.	n.a.



**Table V**  
**Margins on Baking Products**

The margin on overnight deposit rates is the difference between the overnight money market interest rate and the overnight deposit interest rate. The margin for loans with up to one year maturity is the difference between the loan interest rate and the overnight money market interest rate. The margins on 1-5 year loans, consumption and mortgage loans are the difference between the respective loan interest rate and the yield on a 10-year government bond. Consumption loans have the 1-5 year maturity. Mortgage loans are with 10 years and longer initial fixing. Small loans are up to one million euro. Large loans are over 1 mil. euro. All interest rates are on new business and averaged over the first six months of 2004. Interest rate definitions are harmonized across countries. Sources of data are national central banks.

	Overnight Deposits		Loans to Households		Loans to Non-financial Corp.	
	Houshlds.	Corp.	Consumption	Mortgage	Up to 1 year	1 to 5 years
					Small	Big
Czech Republic	1.45	1.35	12.03	0.82	2.61	0.50
Hungary	9.66	9.05	17.65	6.44	1.39	5.68
Latvia	2.33	2.37	10.80	2.99	3.46	3.48
Poland	4.87	4.87	9.52	0.52	2.06	n.a.
Slovakia	3.79	3.51	10.65	2.05	1.90	2.07
<b>Average Accession</b>	4.42	4.23	12.13	2.57	2.29	1.68
<b>Euro Area</b>	1.33	1.15	2.70	0.66	1.95	0.67
<b>Accession minus Euro Area</b>	3.09	3.07	9.43	1.91	0.34	0.74
						1.87
						2.75

**Table VI**  
**Descriptive Statistics of Firm Level Data**

Monthly returns for individual firms are averaged over the March 1999 to April 2004 period. Country average is obtained by calculating the value weighted average across firms. The weights are average market capitalizations of each firm. Market capitalization weight reported in the 4th column is the country's or industry's weight in the overall European index. All data, including the industrial classification, come from IBES.

	Avrg. Monthly Returns	Std. Dev. of Returns	# of Firms	Market Cap. Weight
EMU:				
Austria	0.44	8.7	56	0.00
Belgium	-0.31	9.1	105	0.02
Finland	-0.16	14.8	126	0.03
France	-0.05	10.8	456	0.15
Germany	-0.63	12.2	555	0.13
Greece	-1.05	13.6	166	0.01
Ireland	0.39	11.6	55	0.01
Italy	-0.28	10.0	206	0.07
Netherlands	-0.38	10.2	184	0.09
Portugal	-0.31	8.5	48	0.01
Spain	-0.07	8.8	130	0.05
Non-EMU old EU:				
Denmark	0.57	10.6	117	0.01
Norway	0.58	9.9	134	0.01
Sweden	-0.28	13.0	247	0.03
Switzerland	-0.20	8.6	182	0.08
UK	-0.23	10.4	1014	0.28
Accession Countries:				
Czech Rep.	1.33	11.4	24	0.00
Hungary	0.32	10.0	31	0.00
Poland	0.17	11.5	48	0.00
Industries:				
Basic Industries	0.28	9.5	318	0.06
Capital Goods	-0.15	13.9	664	0.11
Consumer Durables	-0.07	10.7	117	0.03
Consumer Non-Durable	0.10	8.5	391	0.07
Consumer Services	-0.34	12.4	756	0.10
Energy	0.42	7.4	77	0.10
Finance	-0.20	9.7	547	0.26
Health Care	-0.05	8.4	196	0.08
Public Utilities	-0.97	11.4	129	0.15
Technology	-1.69	20.0	580	0.03
Transportation	-0.14	12.2	109	0.01
TOTAL	-0.24	10.6	3884	1.00
EMU	-0.29	10.9	2087	0.58
Non-EMU Europe	-0.19	10.3	1694	0.42
Accession Countries	0.45	11.1	103	0.01

**Table VII**  
**Country and Industry Effects**

Country and industry effects are estimated by regressing the cross section of monthly returns of 3884 European firms each month on country and industry dummies. The coefficients on each set of dummies are restricted to have the value weighted sum equal to zero. The effects reported in the table are averaged over the March 1999 to July 2004 period. The effects are in % per month. The cross sectional averages are value weighted. Average absolute effects are calculated as the weighted average of the absolute values of the estimated effects.

	Average Effect	St.Dev.	Average Absolute Effect
Industry Effects	0.00	n.a.	2.70
Country Effects	0.00	n.a.	3.08
EMU	0.01	3.3	2.19
Non-EMU Europe	-0.04	2.4	1.69
Accession Countries	1.01	6.6	5.37

Table A.1

## 10-year Euro-denominated Bonds Issued by Accession Countries and Their German Benchmarks

This table provides the list of accession country 10-year euro-denominated bonds used to create Figure 3. Each accession country bond is matched with a German 10-year bond issued within six months of the accession bond.

Accession Country Bond				German Benchmark			
Name	Coupon	Maturity	Datastream Code	Name	Coupon	Maturity	Datastream Code
Hungary 1999	4 3/8%	2/16/2009	609217	BR.DTL. AN 1999	3 3/4%	1/4/2009	611124
Hungary 2001	5 5/8%	6/27/2011	17669C	BR.DTL. AN 2001	5%	7/4/2011	17427X
Hungary 2003	4 1/2%	2/6/2013	23728N	BR.DTL. AN 2003	3 3/4%	7/4/2013	25072P
Hungary 2004	4 1/2%	1/29/2014	38360J	BR.DTL. AN 2003	4 1/4%	1/4/2014	36871W
Latvia 2004	4 1/4%	4/2/2014	39404D	BR.DTL. AN 2003	4 1/4%	1/4/2014	36871W
Lithuania 2002	5 7/8%	5/10/2012	21158L	BR.DTL. AN 2002	5%	7/4/2012	21685T
Lithuania 2003	4 1/2%	3/5/2013	23955H	BR.DTL. AN 2003	3 3/4%	7/4/2013	25072P
Poland 2000	6%	3/22/2010	208887	BR.DTL. AN 1999	5 3/8%	1/4/2010	665647
Poland 2001	5 1/2%	2/14/2011	16267J	BR.DTL. AN 2000	5 1/4%	1/4/2011	222018
Poland 2002	5 1/2%	3/12/2012	20525U	BR.DTL. AN 2001	5%	1/4/2012	19896V
Poland 2003	4 1/2%	2/5/2013	23663X	BR.DTL. AN 2003	3 3/4%	7/4/2013	25072P
Slovenia 1999	4 7/8%	3/18/2009	609598	BR.DTL. AN 1999	3 3/4%	1/4/2009	611124
Slovenia 2000	6%	3/24/2010	209132	BR.DTL. AN 1999	5 3/8%	1/4/2010	665647
Slovenia 2001	5 3/8%	4/11/2011	16949K	BR.DTL. AN 2001	5%	7/4/2011	17427X

Table A.II

List of Firms from Accession Countries with International Cross Listings

The dates indicate the month and year of initial listing. The data comes from the Deutsche Borse, London Stock Exchange and Bank of New York Depository Receipts directory.

Firm Name	New York	London	Frankfurt
Czech Republic			
CESKA POJISTOVNA			Aug98
CESKE RADIOKOMUNIKACE	Mar98	Jun98	Oct98
CESKY TELECOM	Jun98	Jun98	Aug01
CEZ			Aug01
KOMERCNI BANKA	Jun95	Jul95	Aug01
PVT			Aug01
SETUZA			Dec02
SEVEROCESKE DOLY			Dec02
STAVB.SILNIC A ZELEZNIC			Dec02
UNIPETROL			Aug01
ZDAS			Dec02
ZENTIVA	Jun04		
Estonia			
AS ESTONIA TELECOM	Feb99	Feb99	Aug01
AS MERKO			Aug98
EESTI UHISPANK	Mar98		
HANSAPANK			Aug01
NORMA			Aug01
Hungary			
BORSODCHEM RT.	Mar99	Mar96	
BUDAPESTI ELEKTOMOS MUEVEK			Dec02
DANUVIUS HOTEL			Aug01
DEMASZ RT	Apr98		
EGIS			Aug01
ESZAKMAGYAR			Dec02
FOTEX RT	Jul92		Aug98
GEDEON RICHTER	Nov95		
GRABOPLAST RT.	Oct97		
INTER EUROPA BANK			Dec00
KONZUM			Jan02
LINAMAR HUNG			Dec02
MAGYAR TAVKOZLESI RT	Nov97		Dec02
MOL MAGYAR	Jan01		Dec02
NORTH AMERICAN BUS INDUSTRIES RT.	Feb99		
NOVOTRADE			Jan02
ORSZAGOS TAKAR			Mar02
OTP BANK	Oct97		
PANNONPLAST RT.	Oct97		Jan02
PICK SZEGED	Dec97		
RABA MAGYAR VAGON			Jan02
STYL RUHAGYAR			Dec02
SYNERGON INFORMATION SYSTEMS	Apr99	May99	
TISZAI VEGYI KOMBINAT RT	Jul96	Aug96	Aug01
ZALAKERAMIA RESZVENYTARSASAG	May97	Jun97	Aug01
ZWACK UNICUM			Aug98
Latvia			
LATVIAN SHIPPING COMPANY	Jun02		
OLAINES KIMISKI-FARMACEITISKA RUPNICA	Jul98		
UNIBANK	Dec97		
Lithuania			
AB LIETUVOS TELEKOMAS	Jun00	Jun00	
BIRZAI MILK JOINT STOCK COMPANY	Dec96		
ROKISKIO SURIS	Nov97		
VILNIAUS BANKAS A.B.	Sep99		
Poland			
AGORA	Mar99	Mar99	Jun00
BANK HANDLOWY W WARSZAWIE	Jun97		
BANK MILLENNIUM	Jul97	Aug97	Jan04
BANK PEKAO		Nov00	
BANK POLSKA KASA OPIEKI	Oct00		
BANK PRZEMYSLOWO-HANDLOWY PBK	Dec01	Jan02	Jul04
EUROPEJSKI FUNDUSZ LEASINGOWY	Feb00		
EXBUD S.A.	Feb98		
KGHM POLSKA MIEDZ	Jul97	Jul97	Aug01
KREDYT BANK PBI	Dec97		
MOSTOSTAL WARSZAWA	May98		Aug98
POLSKI KONCERN NAFTOWY ORLEN	May01	Nov99	Dec02
PROKOM SOFTWARE	Nov97	Feb98	Jun00
SOFTBANK	Apr98		Aug01
STALEXPORT	Jul98		Dec02
TELEKOMUNIKACJA POLSKA	Nov98	Nov98	Aug01
UNIVERSAL	Apr97		
Slovakia			
NAFTA GBELY			Aug98
SLOVNAFT	Apr96		
BTC D.D.	Jun97		
PLIVA			Aug98
Total	45	17	45