FACULTEIT ECONOMIE
EN BEDRIJFSKUNDE

TWEEKERKENSTRAAT 2
B-9000 GENT
Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

WORKING PAPER

Are exporting firms always a good hedge against currency risk? Evidence from Central and Eastern European Countries

Michael Frömmel, Ghent University, BELGIUM
Marina Luetje, Deka Bank, Frankfurt/Main, GERMANY

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Michael Frömmel, Ghent University, BELGIUM[a]
Marina Luetje, Deka Bank, Frankfurt/Main, GERMANY[b]

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Abstract

This paper analyzes the exchange rate exposure of exporting firms in (the so far rarely addressed) largest Eastern European transition economies, i.e. Russia and three EU accession countries (CEEC-3). It also controls for possible effects of different exchange rate regimes. Substantially improving the results from the existing literature we find for more than 80% of firms in our sample a significant exchange rate exposure. However, the magnitude and direction of firms' exposure depends on the particular exchange rate and clearly differs between Russia and the CEEC-3. We find that share prices increase with a depreciation of the domestic currency and only against the US Dollar in Russia, but decrease with a depreciation and only against the Euro in the CEEC-3. Such substantial differences may result from a differing dominance of exposure channels in the respective economies, such as the country-specific export structure and foreign debt. Finally, the switch from a pegged to a flexible exchange rate regime appears to be less important for exposure.

Keywords: Exchange Rate Exposure, Transition Economies, Central and Eastern Europe, International Finance

JEL: F3, G12, G15

[a] Department of Financial Economics, Ghent University, Sint-Pietersplein 5, 9000 Gent, Belgium, michael.froemmel@UGent.be
[b] DekaBank Deutsche Girozentrale, Economics Department, Mainzer Landstraße 16 60325 Frankfurt/Main, Germany, marina.luetje@deka.de

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1. Introduction

The exchange rate exposure of firms, i.e. the sensitivity of firms' stock returns to fluctuations in foreign exchange rates, has been widely discussed since the end of the Bretton Woods system. Theoretical research, such as e.g. by Bodnar et al. (2002), underpins its importance for a firm's value by identifying various channels through which exchange rate shocks are assumed to affect a firm's profitability. Hence, from this perspective, a firm's foreign exchange exposure should be thought relevant not only for risk management decisions of corporate managers, but also for international investors who seek to hedge their portfolio, since the exchange rate exposure is a function of the correlation between the returns of foreign assets and the exchange rate (see Chen et al. 2003 for a review on optimum hedge ratios). Finally, it should also be of interest for policy makers who have to decide about the appropriate exchange rate arrangement for a country. However, the empirical evidence on the theoretically suggested relevance of the exposure is mixed at best (Bodnar and Wong, 2003, He and Ng, 1998, see also Muller and Verschoor, 2006a).

Our study sheds light on the exchange rate exposure of exporting firms in the four transition markets Russia, Czech Republic, Hungary, and Poland. Transition markets have been least focused for this analysis so far. Most of empirical work is on Western industrialized economies (see e.g. Chamberlain et al., 1997, Glaum, 2000), where the exposure is found to be rather modest. However, empirical results suggest that exchange rate exposure seems to be higher in emerging economies: Kiymaz (2003) for example finds that the comparatively high share of 50% of Turkish firms is exposed to foreign exchange risk. Rossi (2011) finds a significant exposure of mixed sign in up to 37% (depending on the methodology) for a sample of Brazilian firms. Parsley and Popper (2006) find a substantial share of South East Asian firms to be exposed. Choe and Cook (2008) analyze 900 emerging market firms, but excluding transition economies, and find exposures of mixed sign. Entorf et al. (2005), who include the transition economies Czech Republic, Hungary and Poland to their sample of 27 countries, provide a similar result for national stock market indices. They find insignificant exchange rate exposures on the aggregate level for the Central and Eastern European Countries (CEEC). The first study solely on Eastern European firms is presented by Muller and Verschoor (2007). They find a significant and on average positively signed

exchange rate exposure for only 19% of Czech, Hungarian and Polish multinational firms. Besides, they report a relation of the exchange rate exposure with firm size and trade openness. However, they only measure the exposure to fluctuations versus the US Dollar.

The low number of studies on CEEC is surprising, as several factors make them an interesting region for analyzing exchange rate exposure. First, most of the countries show an extremely high degree of international trade integration and, thus, form examples of highly open economies. This mainly applies to the new member states of the European Union, but also for Russia, as one of the world's largest exporters of oil and gas. Second, firms in CEEC have less access to financial instruments for hedging their foreign exchange risk. This is due to the comparatively less liquid financial and particularly the foreign exchange market. This lack of financial hedging instruments may also result in a currency mismatch and is seen as one of the main reasons for the well-known "fear of floating"-phenomenon. These first factors, the high degree of trade integration on the one hand, and the lack of hedging opportunities at the same time, mean that firms in CEEC are expected to be more vulnerable to shocks from the foreign exchange markets. Third, and from a European perspective most important, the CEEC as well as Russia have become important trade partners in the European Union. Thus, the analysis of their exposure to the Euro, besides the one to the US Dollar, is of high relevance as well. Fourth and finally, since the history of CEEC and Russia covers various different exchange rate arrangements, including comparatively rigid horizontal and crawling pegs, managed and free floats, they allow studying possible effects of the exchange rate system on exchange rate exposure of firms. For all of these reasons, we expect the exposure of the Eastern European firms to be more pronounced than that found in Western industrialized economies.

Therefore, we contribute to the literature by, first, providing evidence on the exchange rate exposure of exporting firms in the CEEC. We substantially improve the results for Czech Republic, Hungary, Poland[1], compared to the existing literature, which has analyzed the exchange rate exposure either solely on the aggregate level (Entorf et al. 2005) or on the firm level but only versus the US dollar (Muller and Verschoor 2007), although CEEC perform most of their trade with European Countries. Furthermore we are – to the best of our knowledge – the first to provide an analysis for Russia. Second, we address the ambiguity of findings in the literature: Thinking of potentially offsetting effects competing impacts from a textbook-like positive expenditure switching effect and negative balance-sheet effects on the other hand we assume that the relevance of these channels and thus the direction of exposure

[1] These are the three most important stock markets among the new member countries of the European Union.

may vary in single markets. Our result corroborates with those by Morck et al. (2000) and Chue and Cook (2008), who come to the conclusion that for emerging markets the within-country correlation is higher than in developed markets and thus country-specific factors can be expected to be more relevant compared to firm-specific factors in emerging markets. Hence, we do not pool all countries in just one joint sample, but regard the CEEC-3 and Russia separately. This split should avoid a canceling-out of opposite exposure directions, if there were any. It can be justified by similar export structures within the CEEC-3, which clearly differ from the Russian one. Third, in addition to the US Dollar, we also analyze the exposure to the Euro, which has been neglected in the literature for Eastern Europe so far, although the European Union is the by far most important trade partner for the Eastern European countries. Fourth, since most CEEC started with comparatively tight pegs, before they proceeded to more flexible exchange rate arrangements, the question arises whether the exchange rate regime affects the foreign exchange risk exposure of firms**.** Our sample period allows to examine this. Fifth, in contrast to existing studies using daily data we take volatility clusters into account and apply a GARCH model, thus improving the accuracy of our estimates.

The evidence rather favors our approach. First, we find over 80% of exporting firms in our sample to be significantly exposed to daily exchange rate movements in both, Russia and the CEEC-3. This exposure is clearly higher than those reported in the literature so far (e.g. 50% in Kyimaz (2003) for Turkey, 37% in Rossi (2011) for Brazil, 20% in Dominguez and Tesar (2006) for eight (non-US) industrialized and emerging markets; 19% in Muller and Verschoor (2007) for Czech Republic, Hungary, and Poland). Second, in Russia compared to CEEC-3, the exposures to the US Dollar and Euro indeed have different magnitudes and opposed directions – a significant finding, not yet documented in the literature. In detail, the exposure of exporting firms' stock returns to the US Dollar is considerable and negative in Russia, but only small and positive in the CEEC-3. In contrast, the exposure to the Euro is not significant in Russia, but of considerable magnitude and positive in the CEEC-3.[2] Finally, the exposure seems not to be substantially influenced by fixed exchange rate regimes.

Several implications can be derived from our results. Our findings confirm the convincing intuition for the significant dependence of the CEEC-3 on the Euro rate and also support the expectation for a differing importance of exposure transmission channels in single countries: Whereas the expenditure switching effect appears to dominate in Russia, in the

[2] A negative (positive) exposure means that a depreciation of the domestic currency goes along with an increase (decrease) of a firm's share price.

CEEC-3 balance sheet effects seem to be more relevant. Thus, our results matter for both, investors and researchers. For investors, since the reference currency as well as country-specific structures matter for the direction and strength of exchange rate exposure, and therefore affect strategies for hedging currency risk, and for researchers, since pooling firms from various countries may weaken the results.

The remainder of the paper is organized as follows. The subsequent Section 2 reviews the theoretical rationale behind exchange rate exposure. Section 3 and Section 4 introduce our dataset and methodology. Our empirical results are described in Section 5, while Section 6 summarizes and concludes.

2. The FX Exposure of Firms

There are several potential channels through which a firm's value may be affected by movements on the foreign exchange market. First, an appreciation of the domestic currency may erode the firm's *competitiveness* on international markets, since the revenues of the firm get smaller. The opposite holds in the case of a depreciation. The effect does of course reverse for importing firms, as the price for their imports in local currency rise. Second, Even if a company is purely domestic, i.e., it does not export nor import at all, it might be affected through the channel of competitiveness, as an appreciation of the domestic currency may support foreign competitors in the domestic market. Furthermore, exporting firms are often supposed to hold foreign assets related to their foreign business. The value of foreign assets decreases (increases) with an appreciation (depreciation) of the domestic currencies.

Second, domestic firms with net *foreign denominated debt* will gain (lose) with an appreciating (depreciating) domestic currency[3]. This was a problem in CEEC particularly during the first years of transition, as the underdeveloped financial markets forced firms to borrow abroad, whereas foreign lenders were not willing to lend in the currency of the transition economy, which led to a currency mismatch (see Eichengreen et al., 2003, the "original sin"). Obviously the effect of foreign denominated debt is unrelated with the firm's role as an exporter or importer, but solely depends on the financing structure of the company. Furthermore there is an indirect effect, since private households and the public sector holding debt denominated in foreign currency may also cut their expenses if the domestic currency

[3] This is part of the translation exposure (Muller and Verschoor 2006a). There may of course also be the case of foreign assets, which is less relevant for transition economies. Muller and Verschoor (2006a) furthermore refer to transaction and contractual exposure. Since their effect should be short-lived we do not consider them further.

depreciates and accordingly their debt burden in domestic currency increases. Thus, domestic demand will decrease.

Finally, share prices and currency fluctuations may be connected via *capital flows* due to *portfolio investments*. If foreign investors buy domestic stocks they might move both, the exchange rate and the stock price. Although this implies a co-movement of the domestic currency and the stock price – rather than what is traditionally understood as the foreign exchange exposure – this relation may be found in empirical testing. Similarly to foreign debt, portfolio investments are of particular importance for CEEC, which have been exposed to substantial amounts of capital inflows (or outflows) during the last two decades, making them more similar to other emerging economies than to industrialized developed countries.

Table 1 summarizes the respective effects on share prices. The case is obviously easier for importing and domestic firms, for which all channels point to the same direction. In contrast, the share prices of exporting firms may on the one hand benefit from a depreciation due to increased competitiveness, or they may suffer from the increased debt burden or from lower demand due to capital outflows that at the same time let the currency depreciate.

The ambiguous relations between exchange rate fluctuations and share prices also explain why empirical studies in most cases find a comparatively low foreign exchange exposure (for a survey see Muller and Verschoor, 2006a). The question of which effect is dominating is therefore an empirical one and does not even necessarily lead to the same result in each single country.

3. Data

This study considers the four largest Eastern European stock markets of Russia, Czech Republic, Hungary, and Poland (CEEC-3). Thereby, the focus is on daily returns of all stocks which have ever been included to the respective domestic stock index and which are available on DataStream. The use of daily data is common in the literature (see e.g. Chamberlain et al., 1997, Di Iorio and Faff, 2000, Glaum, 2000). As can be seen from Table 2, our sample includes 92 stocks that are available on DataStream (out of 133 stocks which have ever been in the index) from the stock index RTS in Russia, 12 (55) from the PX in the Czech Republic, 17 (18) from the BUX in Hungary, and 28 (49) from the WIG in Poland. Our sample covers the period from September 1st, 1995 – April 30th, 2009, and therefore nearly the whole transition period, except the most volatile phase in its earliest stage.

We assign each market's stocks to three portfolios, containing exporting, importing and domestic firms, respectively. A firm is defined as an "exporting" ("importing") one if the share of its revenues from export (import) sales to total sales exceeds 40%. If both shares are below 40%, a company is assigned to the portfolio "domestic". Assigning a firm to the groups according to their share of foreign activities is commonly used in the empirical literature. Pritamani et al. (2004) suggest a share of 50%. Since our lower share of 40% classifies more firms as exporting or importing, this choice heightens the stakes to find any impact of exchange rate changes and makes our conclusions even more conservative.

Overall, our classification results in 51 exporting firms, 7 importing firms and 91 domestic firms. Due to the small number of importing firms, we only focus on exporting and domestic stocks in further analysis. Table A.1 in the appendix additionally gives a short description of exporting firms' activities as well as their engagement in export sales.

The three EU-markets Czech Republic, Hungary, and Poland are also jointly analyzed as a CEEC-3 group, since only a small number of stocks is available for a single country, in particular for the Czech Republic or Hungary. This grouping can be justified by the fact that the three countries turn out to provide quite similar results. Thus, we end up with two comparatively homogeneous groups: Russia with 30 exporting and 58 domestic, and the CEEC-3 with 21 exporting and 33 domestic firms' stocks (see Table 2).

Since the CEEC-3 have not yet joined European Monetary Union and introduced a common currency, we need to construct a synthetic domestic currency, as a weighted average of the country-specific domestic currencies. To calculate these synthetic exchange rates for the CEEC-3 group, i.e. EUR/CEEC-3 and USD/CEEC-3, we use the IMF DOT (direction of trade) statistics data on the Czech, Hungarian and Polish exports to the Euro-Area-16 and the USA. The weight for the respective market's exchange rate within the effective exchange rate is calculated as its respective share of export in the total CEEC-3 exports to the Euro-Area-16 and the USA.

This results in a rather equal weighting of the Czech, Hungarian and Polish exchange rates within both effective exchange rates for the CEEC-3:

$$\Delta\text{EUR/CEEC-3} = 0.37\cdot\Delta(\text{EUR/CZK}) + 0.28\cdot\Delta(\text{EUR/HUF}) + 0.35\cdot\Delta(\text{EUR/PLZ})$$

$$\Delta\text{USD/CEEC-3} = 0.32\cdot\Delta(\text{USD/CZK}) + 0.36\cdot\Delta(\text{USD/HUF}) + 0.32\cdot\Delta(\text{USD/PLZ})$$

Thus, the effective exchange rates represent the price of the constructed synthetic "domestic" currency of the CEEC-3 group versus the Euro and the US Dollar, respectively.

4. Methodology

We measure exchange rate exposure by estimating the equation

$$r_{i,t} = \alpha_i + \beta_i \cdot r_{m,t} + \gamma_{i,€} \cdot \Delta e_€ + \gamma_{i,\$} \cdot \Delta e_\$ + \Sigma_{k=1..K} \delta_{i,k} \cdot D_{t,k} + \varepsilon_t \quad (1)$$

which is an extension of the commonly used approach by Adler and Dumas (1984) and Jorion (1990). In equation (1) $r_{i,t}$ is the return of a portfolio of stocks or a single share i on day t; $r_{m,t}$ is the return of a benchmark portfolio; $\Delta e_€$ and $\Delta e_\$$ are changes of the price of the domestic currency versus the Euro and the US Dollar, respectively[4]. Such bilateral rates have been used, for instance, by Williamson (2001) and Parsley and Popper (2006), while most existing studies rely on effective exchange rates. Although not incorporating it in one equation, Dominguez and Tesar (2006) also stress the different importance of currencies for the exposure**.** $D_{t,k}$ are appropriate dummies, i.e. for the introduction of the Euro (January 1, 1999) and for the accession to the European Union (January 1, 2004 for the CEEC-3). In addition, our regression also contains calendar dummies for January and December to account for a potential turn-of-the-year effect (see Reinganum, 1983).[5]

The benchmark portfolio differs from the market portfolio in two respects: First, according to Bodnar and Wong (2003) a value-weighted portfolio may lower the significance because large international) firms are more likely to be exposed to currency risk. They suggest using an equally-weighted portfolio. Pritamani et al. (2004) go one step further and suggest using a benchmark portfolio that exclusively contains shares of domestic stocks. This is to avoid that it is affected by the exchange rate exposure of exporting firms under consideration here. Second, since one may also expect domestic firms to be exposed to exchange rate changes, a multicollinearity problem occurs. We therefore additionally orthogonalize the market return on exchange rate fluctuations by running a side regression of the portfolio of domestic stocks on exchange rate changes, as suggested by, e.g., He et al. (1996) or Kiymaz (2003)[6]. Our benchmark return therefore measures the market return that is

[4] The use of the changes of the domestic currency against the US Dollar and the Euro in the same equation may potentially lead to multicollinearity problems, which make it difficult to distinguish the individual effects of the currencies. The reason is that multicollinearity, although it will not bias the estimates, increases the standard errors on the individual coefficient estimates. However, multicollinearity seems not to be a serious problem. The correlations between the exchange rate returns versus the US Dollar and Euro respectively are about 0.45. Both, Parsley and Popper (2006) and Williamson (2001), use a similar approach and find correlations that in some cases reach 80-90%. As in our analysis, they do not experience estimation problems in terms of inflated standard errors.

[5] We also added dummies to account for potential day-of-the-week effects. The results however, are not significant nor do they improve the estimations. Therefore we do not report them, they are available from the authors on request.

[6] As a robustness check we also regressed the exchange rate changes on the benchmark portfolio, as also found in the literature (see Choi and Prasad 1995). This does, however, not substantially change the results**.**

not explained by currency fluctuations. Accordingly, the coefficients $\gamma_{i,€}$ and $\gamma_{i,\$}$ provide the residual exchange rate exposure of firm i (Muller and Verschoor, 2006a).

Since financial time series at daily frequency generally suffer from hetereoskedasticity and volatility clustering, we model the error term ε_t as a GJR-GARCH model (Glosten et al., 1993) that additionally allows for an asymmetric reaction of volatility to the sign of the previous return:

$$\varepsilon_t \sim N(0,\sigma_t^2)$$

$$\sigma_t^2 = \omega + \alpha\cdot\sigma_{t-1}^2 + \beta\cdot\varepsilon_{t-1}^2 + \gamma\cdot I_{>0}(\varepsilon_{t-1}) \quad (2)$$

where $I_{>0}(\cdot)$ is an indicator function that takes the value one, if the argument is positive and zero else. The estimates show that the use of a GARCH-type model is justified, the coefficients α and β, and in most cases also γ are significant and reflect both, conditional heteroskedasticity and asymmetry in the volatility process.

Equation (1) treats the exchange rate exposure as being independent from the exchange rate regime. Since the choice of an exchange rate regime may also affect firms' exposure to currency risk, we additionally use dummy variables that reflect pegged, and therefore less variable, exchange rates and estimate interaction terms of these dummies with the exchange rate exposure coefficients. Equation (1) then evolves to:

$$r_{i,t} = \alpha_i + \beta_i\cdot r_{m,t} + \gamma_{i,€}\cdot\Delta e_€ + \gamma_{i,\$}\cdot\Delta e_\$ + \Sigma_{k=1..K}\delta_{i,k}\cdot D_{t,k} + \Sigma_{k=1..K}(\vartheta_{i,€}\cdot\Delta e_€ D_{t,k} + \vartheta_{i,\$}\cdot\Delta e_\$ D_{t,k}) + \varepsilon_t \quad (3)$$

and differs from equation (1) by the interaction terms $\Delta e_€ D_{t,k,€}$ and $\Delta e_\$ D_{t,k\$}$, which shall capture a change in the foreign exchange exposure (e.g. a different level) during times of pegged exchange rate regimes compared to floating ones.

The dummies $D_{t,k,€}$ and $D_{t,k\$}$ take the value one, if the domestic currency is pegged to the € or $ respectively, and zero else. In detail, these dummies indicate the following periods. Before passing over into a managed or a free float, in the Czech Republic, the exchange rate was pegged to a basket of Deutsche Mark and US Dollar until May 26, 1997; in Poland – to a basket including both, Deutsche Mark/EUR and US Dollar, until April 11, 2000; and in Hungary – to a basket of Deutsche Mark/EUR and US Dollar until December 31, 1999, and only to EUR since January 1st, 2000 until February 26, 2008. As the time of abandoning the fixed exchange rate regime differ, it is not possible to introduce one joint dummy variable for all the three CEEC markets here. In the Russian Federation, there are two regime switches observable in our sample. During the Russian crisis, the initial peg to the US Dollar was replaced by a floating exchange rate regime starting on September 2nd, 1998. However, since

February 1st, 2005 the Ruble has been again pegged, this time to a bi-currency basket consisting of Euro and US Dollar.

5. Empirical Results

5.1 Results on the Aggregate Level

Baseline Results

The estimation results for the portfolios are given in Table 3a (portfolio of exporting firms). For comparison we also report the results for the benchmark portfolio in Table 3b. In all equations in Table 3a the relation with the benchmark portfolio is highly significant and of considerable size. In contrast, the impact of the remaining variables differs substantially. We find significant January and December effects for the CEEC-3, which are obviously mainly due to the Polish market. The introduction of the Euro in 1999 and the accession of the CEEC-3 to the European Union in 2004 only have a marginal (although in some cases significant) effect. Furthermore, we find a significant, but economically negligible effect of both variables on the Russian domestic portfolio (Table 3b).

However, the coefficients on the exchange rate exposure show, first, a clear and significant pattern, and second, remarkable differences between Russia on the one and the CEEC-3 on the other hand.

Both, the Russian and the Central European share prices show a significant relation with exchange rate changes. This applies to exporting firms and for Russia also to domestic firms. The effect is economically significant; the most pronounced coefficients are close to 0.4, meaning that a one per cent change in the exchange rate goes along with a change in the stock return by almost 0.4 per cent. This result is roughly in line with Chue and Cook (2008), who report an average (but positive) exposure of 0.4 for a set of 15 non-European emerging markets although using an effective exchange rate and are economically significant.

It turns out that stocks of exporting firms (Table 3a) on the Russian market react strongly and significantly negatively to changes in the USD/RUB exchange rate, meaning that a depreciation of the Ruble leads ceteris paribus to increasing share prices. This is in line with the competitiveness channel, which means that foreign revenues of Russian exporters increase, if the Ruble depreciates. The observation can be explained by the particular structure of the Russian exporting sector, which is characterized by a substantial share of oil and gas exporting firms, but also companies from the metals and mining sector, see Table A.1 in the

appendix. This has two effects: First, since these products are to a large extent traded in US Dollar, while most of the expenses are paid in Ruble, a depreciation of the Ruble immediately increases the firm's profits. Accordingly, the reaction of Russian exporting firms to changes in the EUR/RUB rate is moderate and insignificant. Second, since the traded goods are rather homogeneous, the price setting abilities of exporters on the world market are limited, which increases the impact of exchange rate fluctuations on exporters' revenues.

Exporting firms in the CEEC-3, i.e. Czech Republic, Hungary and Poland, show different behavior: In contrast to Russian exporting firms, their returns are mainly exposed to changes in the Euro exchange rate, and only to a small extent (albeit significantly) to changes in the US Dollar exchange rate. Furthermore, their currency risk exposure shows the opposite sign compared with the Russian exporting firms, i.e. an appreciation of the domestic currencies goes along with price increases of the exporting firms.

The results raise the question which channels – other than changes in firm's competitiveness – dominate for the CEEC-3. As mentioned in the introduction, mainly portfolio investments and foreign debt may cause a positive (but in the case of portfolio investments not necessarily causal) relation between the price of the domestic currency and the share price of exporting firms[7]. Unfortunately, both series are not available at high frequency but only on a yearly basis, so we cannot incorporate them into our model, but consider their evolution over time to detect explanatory differences between the CEEC-3 and Russia.

For domestic firms (Table 3b) we find that their currency exposure in Russia shows the same inverse relation with the exchange rate of the US Dollar as for the exporting firms, while there is a significantly positive relation with changes in the RUB/EUR rate. The Euro exposure, however, is substantially smaller, in absolute terms, than the exposure to the US Dollar, 0.029 compared to -0.342. For the CEEC-3 we do not find any significant exchange rate exposure for domestic firms at all.

Figure 1 shows the evolution of inflows of portfolio investments for Russia and the CEEC-3 calculated as per cent of the stock market capitalization. It serves as a measure of the dependence of the stock market on foreign investors. The difference is comparatively small,

[7] We also checked whether the difference can be due to an asymmetric exchange rate exposure (see Koutmos and Martin 2003) in combination with a long term exchange rate trend, since Poland and Hungary maintained a crawling peg for a substantial fraction of the sample period (Hungary until October 2001, Poland until April 2000), which led to a long-lasting depreciation of the domestic currency. However, although the exchange exposure is slightly higher, if the exchange rate depreciates (0.525 versus 0.458) the difference is small and not statistically significant.

although the CEEC-3 show a slightly higher share of foreign investors, particularly in the first half of the sample period. It seems to be unlikely that this difference is responsible for the huge difference in foreign exchange risk exposures between the CEEC-3 and Russia.

In contrast, the difference in the amount of foreign debt, as displayed in Figure 2, is much larger.[8] While all countries but the Czech Republic show a substantial increase in private external debt (most pronounced for Hungary, where the foreign debt quadrupled during the sample period), the levels are different: in Russia it increased smoothly to a moderate level of slightly more than 20% of GDP in 2009. In the CEEC-3, the share of foreign debt is substantially higher (peaking at 80% of GDP for Hungary) and sharply increasing in Hungary and Poland. Therefore, due to their high dependence on foreign debt, the CEEC-3 seem to be much more vulnerable to currency risk than Russia. Furthermore, for the CEEC-3 the Euro plays a dominating role for funding: Most of the foreign debt in the CEEC-3 is denominated in Euro, and just a small fraction in US Dollar[9], while in Russia the US Dollar plays a more prominent role. In view of that, the foreign debt channel is likely to dominate for the CEEC-3, causing the observed positive relation between the domestic currency price and the share prices of exporting firms.

The Impact of the Exchange Rate Regime

The countries under consideration have experienced various exchange rate regimes. All countries started with comparatively tight pegs. The Bank of Russia pegged the Ruble to the US Dollar until they switched to a managed float in September 1998. In February 2005 they again introduced a peg, this time to a currency basket consisting of the Euro and the US Dollar, in which the Euro gained subsequently higher importance. The Czech Republic abandoned their peg (65% Deutsche Mark and 35% US Dollar) in May 1997 after a currency crisis and introduced a managed float. Hungary started with a crawling peg against a basket of Deutsche Mark and US Dollar, before the Euro was introduced as the only anchor currency in January 2000. Only in 2010 the Hungarian Forint was allowed to float. Finally, the Polish central bank relied on a crawling peg, and switched in January 1999 from a multi-currency-

[8] While figure 2 displays the debt denominated in foreign currency for the whole private sector captures both the direct and the indirect impact on firms, the picture does not change a lot, if we only consider corporate debt, see Haiss and Rainer (2012).

[9] Czech Republic: 86.1% in Euro/10.8% in US Dollar, Hungary: 66.0%/13.4%, Poland: 68.7%/17.4% (outstanding bonds and notes in the respective currency as a fraction oft he total amount of internationally issued bonds and notes of he respective country in 2004, source: Lane and Milesi-Ferretti 2007).

basket of five currencies to a basket of Euro and US Dollar. The latter episode lasted not much more than one year: Since April 2000 the Zloty floats freely.

In order to test for the impact of the exchange rate regime we additionally add interaction terms between a dummy for fixed exchange rate regimes and the exchange rate returns. The dummy takes the value one, if the domestic currency is pegged against the respective currency and zero otherwise. The Czech Republic is a special case: Since the composition of the basket never changed we use the interaction term between the dummy and the return of the basket. Otherwise multicollinearity problems occur. Thus we cannot distinguish the impact on the exposure for each currency separately.

The results can also be found in Tables 3a and 3b, as an extra column next to the baseline regressions. The results, however, are mixed and not clear. Although we find a significant relation between the exchange rate regime and exchange rate exposure of exporting firms for Poland (USD and EUR), the Czech Republic and Hungary (both only USD) and of domestic firms for Poland (EUR), Hungary (USD) and Russia (USD), the signs of the coefficients differ and do not show a clear pattern. We therefore conclude that, at best, the exchange rate regime plays a minor role for the (level of) exchange rate exposure of firms.

Stability of the Coefficients

The question arises how stable the coefficients found are over time. For this purpose we employ both rolling regressions and an analysis of subsamples for our portfolios of exporting firms. For the rolling regressions we use an estimation window of 500 observations. For the subsamples we split the total sample into three periods of similar length. Subsample 1 (1995 to 1999) includes the turbulent first years of transmission with the currency crises in the Czech Republic (1997) and Russia (1998) and the rise of the dotcom bubble in the Western economies. Subsample 2 (2000-2004) is the burst of the dotcom bubble and subsample 3 (2005-2009) is the tranquil period preceding the current financial crisis.

The rolling regressions, shown in Figure 3 exhibit a fairly stable exchange rate exposure for the Russian Ruble against the US Dollar. However, the graph also shows a substantial impact of the Russian crisis 1998 on the stability of the coefficients. During the crisis the coefficient becomes extremely unstable and even changes its sign. The most likely reason are withdrawals of foreign portfolio investments during the crisis which put pressure on both the value of the Ruble and share prices. Another more volatile period are the years 2003 to 2005.

However, excluding these periods from the sample does not substantially change the estimations.

We do not observe the same stability for the exposure of Russian firms' shares to the Euro: The value fluctuates around zero and change their sign several times. The picture from the rolling regressions is confirmed by looking at the subperiods (Table 4). While the exposure to the Euro is (even significantly) positive during the first subsample, it fluctuates around zero for the subperiods 2 and 3. In contrast, the coefficient for the exposure to the US Dollar is reliably negative for all subperiods with value smallest in absolute terms during the period 2000 to 2004.

The results for the CEEC-3 confirm those for the whole sample. The exposure to the Euro is significantly positive for the rolling regression as well as for all three subsamples. Again, we find a decline in magnitude for the subsample 2000 to 2004. The dispersion of the exposure seems to be slightly higher than in the case of Russia. Furthermore, it seems that recently the exposure of the CEEC-3 to the US Dollar has substantially increased and became significant.

5.2 Results on the Firm Level

Since the empirical literature suggests that estimations on the firm level provide clearer results than on the aggregate level (Khoo, 1994, Choi and Prasad, 1995, Muller and Verschoor, 2006b), we additionally estimate equation (1) on the firm level. The results are given in Table 5a for exporting and 5b for domestic firms. They confirm and strengthen our insights from the aggregate level (Tables 3a and 3ba).

For Russia, the negative exposure to the US Dollar rate is striking. Out of 30 exporting firms, the share price of 28 firms increases when the Ruble depreciates, which is significant for 25 firms. From the only two firms with a positive exposure, one is significant.[10] The exposure of Russian exporting firms to changes in the Euro rate is almost equally distributed (17 negative, 13 positive) and insignificant in most cases. The distribution for Russian domestic firms looks similar, although with a higher share of significant exposures to the Euro rate (about 50% here).

[10] This single Russian exporting firm with a significantly positive exposure is Mechel OAO, Russia's largest exporter of coking coal concentrate, having an exchange rate exposure of 1.681 to Euro and of 1.658 to the US Dollar. We resisted the temptation to re-categorize this company and kept in the set of exporting firms, leaving our results more conservative.

Again, the CEEC-3 present a contrary picture with positive exposures mainly to the Euro rate. This is the case for 19 (18 of them being significant) out of 21 exporting firms. The exposure to the US Dollar exchange rate is less pronounced, but a slight majority of firms also shows positive coefficients. In contrast to the aggregate level, the domestic firms also show a more pronounced positive exposure to the Euro exchange rate (31 out of 33, 24 being significant). This result is in line with the before assumed dominance of the foreign debt channel for the CEEC-3, as the value of foreign debt, which is substantial in the CEEC-3, naturally affects the price of a firm, mo matter whether it is an exporting or a domestic one.

6. Conclusion

This paper extends the scarce literature on foreign exchange exposure in Eastern European transition markets by examining the relationship between their exporting firms' stock returns and fluctuations in both, the US Dollar and Euro exchange rates. In particular, we focus on the four transition economies Czech Republic, Hungary, Poland (CEEC-3) and Russia in the period from September 1995 to April 2009.

In both, Russia and the CEEC-3, we find statistically and economically significant, but different patterns of exposure to the two reference currencies. (1) In Russia, 80% of exporting firms exhibit a strong and negative exposure to the US Dollar rate, meaning that a depreciation of domestic currency against the US Dollar goes along with an increase of exporting firms' share prices. This result suggests a dominant effect arising through the competitiveness channel. Thereby, the exposure to the Euro is mixed and significant only for 20% of Russian firms. (2) By contrast, in the CEEC-3, 86% of exporting firms display a strong and positive exposure to the Euro rate and only a slight one to the US Dollar, which can rather be explained by the foreign debt channel. (3) Furthermore, we find that the exchange rate regime does not seem to be substantially relevant for share prices.

Our results provide one possible explanation for why many empirical studies fail to find a clear exchange rate exposure (see e.g. the survey by Muller and Verschoor, 2006a). Since most of these studies include firms from a variety of countries, the poor results may be partly due to the disappearance of separated country-specific effects in cross-country samples. In our sample, this would mean that the revealed opposite signs of exposures in Russia and the CEEC-3 cancel out in a joint sample.

Moreover, finding exporting firms not always feature a negative exposure to foreign exchange movements, investors should be aware that investments in exporting firms are not always a good hedge against foreign exchange risk, as it might be conventional wisdom. Our results show that the direction of the exposure to the US Dollar and Euro varies countrywise. Being a US investor in Russia, the foreign exchange risk (of an investment in Ruble) can be partly hedged by buying stocks of Russian exporting firms. The latter would at least compensate for a depreciation of the Ruble by increasing share prices. However, this hedging effect would not exist for a Euro-zone investor in the CEEC-3. By contrast, as in the CEEC-3 the exposure of exporting firms to the Euro is positive, a depreciation of the CEEC-3 currencies against the Euro goes along with decreasing share prices of exporting firms. Therefore, this effect would even more reduce the profits from holding CEEC-3 exporting firms. For the US Dollar, the exposure is much weaker but not clear in direction. Thus, investors should distinguish these country- and currency-specific effects, when aiming to hedge their foreign investments against foreign exchange risk.

Finally, one potential reason for the found opposite exposures in our two sub-samples might be the varying dominance of the exposure transmission channels in Russia and the CEEC-3. We may assume all the three channels – influencing share prices through the competitiveness, the foreign debt or portfolio investments – to have some impact. However, in particular the dominance of the competitiveness channel in Russia suggests the structure of exports to be of particular relevance here. Russia mostly exports homogeneous goods like oil and gas (according to the Statistical Office of the Russian Federation, mineral products account for almost two third of Russian exports), which price is in USD as well as largely determined by the world market and not by the firm itself. This makes Russian exporting firms more vulnerable to changes in the exchange rate, which directly affect their profits. Exporting mostly not fully homogeneous industrial products (according to the EBRD, over 50% of total CEEC-3 exports are sold to the EU, thus generating revenues in EUR), the firms in the CEEC-3 might be able to adjust their prices to their domestic currency price fluctuations. Thus, assuming that exporting homogeneous goods (like oil and gas) provides fewer opportunities to compensate for lost profits (due to currency risk) by price adjustments, the exposure to exchange rate fluctuations rises and gets more negative. This view provides an alternative explanation for Russian exporters' high exposure to the USD/RUB rate fluctuations and, thus, for a strong competitiveness channel in Russia. However, although exchange rate exposure has "many facets" (Bartram et al., 2010), we retrieve remarkably stable results per country group.

Summing up, our results allow for relevant conclusions and implications from both the practical and the academic perspective. Investors should take into account that firms' exposure to the price of a foreign currency may differ across economies. Due to this, researchers should not merge (economically) differing economies in just one sample, because otherwise country-specific exposures, which result from a country's individual economic and export structure, might cancel each other out. This would hinder the detection of a clear exchange rate exposure.

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TABLE 1. Relations between share prices and exchange rate

	Exporting firms	Importing firms	Domestic firms
Competitiveness channel	– [a)]	+	(+) [b)]
Foreign debt channel	+	+	+
Portfolio channel	+	+	+

[a)] "– ": negative correlation between domestic currency and share prices. i.e. depreciation (appreciation) of the domestic currency goes along with an increase (decrease) of share prices.
[b)] Potential and weaker indirect effect via foreign competitors on the domestic market.

TABLE 2. Descriptive statistics

	All stocks [a)]	Exporting (N)	Importing (N)	Domestic (N)
Russian Federation (RTS)	92 (133)	30	4	58
CEEC-3:	57 (122)	21	3	33
- Czech Republic(PX)	12 (55)	4	0	8
- Hungary (BUX)	17 (18)	6	0	11
- Poland (WIG)	28 (49)	11	3	14
Total number:	149 (255)	51	7	91

[a)] Number (N) of stocks available in DataStream (number of all stocks ever been included in the index).

TABLE 3a Portfolio results for *exporting* firms and exchange rate regimes

	Results for the mean equation of a GJR (1,1) regression [a]								
	Russia		*CEEC-3*	*Czech Republic*		*Hungary*		*Poland*	
		Regime			*Regime*		*Regime*		*Regime*
c	0.000	0.000	**0.001*****	**-0.001*****	**-0.001*****	**0.001*****	**0.001*****	**0.001*****	**0.001*****
	(0.307)	(0.295)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.001)**
r_D	**0.469*****	**0.473*****	**0.710*****	**0.578*****	**0.561*****	**0.454*****	**0.453*****	**0.454*****	**0.449*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Δe€	-0.010	-0.005	**0.393*****	0.017	0.001	**0.144*****	**0.133*****	**0.354*****	**0.304*****
	(0.507)	(0.794)	**(0.000)**	(0.436)	(0.973)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Δe$	**-0.379*****	**-0.389*****	**0.065*****	0.012	0.019	**-0.030*****	**-0.026****	**0.071*****	**0.094*****
	(0.000)	**(0.000)**	**(0.000)**	(0.449)	(0.226)	**(0.002)**	**(0.014)**	**(0.000)**	**(0.000)**
JAN	0.000	0.000	**0.001****	0.000	0.000	0.000	0.000	0.001	0.001
	(0.804)	(0.805)	**(0.042)**	(0.295)	(0.189)	(0.845)	(0.835)	(0.331)	(0.288)
DEZ	0.000	0.000	**0.001*****	0.000	0.000	0.000	0.000	**0.003*****	**0.003*****
	(0.745)	(0.748)	**(0.001)**	(0.383)	(0.282)	(0.893)	(0.890)	**(0.000)**	**(0.000)**
Euro 1999	0.000	0.000	0.000	**0.001*****	**0.001*****	**0.000***	**0.000***	**-0.001****	**-0.001***
	(0.672)	(0.710)	(0.182)	**(0.001)**	**(0.000)**	**(0.052)**	**(0.073)**	**(0.023)**	**(0.088)**
EU 2004	0.000	0.000	**0.000****	0.000	0.000	0.000	0.000	**-0.001****	**-0.001***
	(0.324)	(0.319)	**(0.020)**	(0.956)	(0.946)	(0.242)	(0.240)	**(0.045)**	**(0.056)**
fix $\Delta e_€$		-0.004			**0.503*** **		0.012		**0.200*****
		(0.922)					(0.587)		**(0.000)**
fix $\Delta e_\$$		0.023			**(0.000)**		**-0.056***		**-0.182*****
		(0.499)					**(0.073)**		**(0.003)**
Adj. R^2	0.45	0.45	0.55	0.12	0.09	0.44	0.44	0.50	0.50
DW [b]	2.0	2.0	1.8	1.8	1.8	1.9	1.9	1.8	1.8

[a] The exchange rate is given in indirect quotation (foreign to domestic currency). Thus, a negative coefficient means that a depreciation (appreciation) of the domestic currency, or a decrease (increase) in the exchange rate, goes along with an increase (decrease) in share prices and vice versa. JAN, DEZ, Euro 1999, EU 2004 are the dummy variables as explained in Section 4. fix $\Delta e_€$ and fix $\Delta e_\$$ are the interaction terms between exchange rate fluctuation and the exchange rate regime. In the case of the Czech Republic we cannot distinguish the effect of a fixed exchange rate separately for USD and EUR, since the CZK was pegged against a currency basket with constant weights throughout the whole period fixed exchange rate.

[b] Durbin Watson (DW) test

Asterisks refer to level of significance: * 10%, ** 5%, *** 1%

TABLE 3b Portfolio results for *domestic* firms and exchange rate regimes

Results for the mean equation of a GJR (1,1) regression [a)]

	Russia		*CEEC-3*	*Czech Republic*		*Hungary*		*Poland*	
		Regime			*Regime*		*Regime*		*Regime*
c	0.000	0.000	0.000	0.000	0.000	**0.001*****	**0.001*****	0.000	0.000
	(0.269)	(0.324)	(0.758)	(0.844)	(0.810)	**(0.000)**	**(0.000)**	(0.376)	(0.658)
Δe€	**0.029****	**0.043*****	0.018	0.018	**0.024***	**0.199*****	**-0.176*****	**0.091*****	**0.299*****
	(0.038)	**(0.010)**	(0.136)	(0.136)	**(0.059)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Δe$	**-0.342*****	**-0.375*****	-0.009	-0.009	-0.009	**-0.022***	**0.027***	**0.043****	**0.071*****
	(0.000)	**(0.000)**	(0.261)	(0.261)	(0.267)	**(0.096)**	**(0.056)**	**(0.037)**	**(0.005)**
JAN	0.000	0.000	0.000	0.000	0.000	**0.001*****	**0.001*****	0.000	0.000
	(0.728)	(0.728)	(0.254)	(0.254)	(0.257)	**(0.001)**	**(0.001)**	(0.672)	(0.998)
DEZ	**-0.001*****	**0.000*****	**0.001***	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	**(0.002)**	**(0.098)**	(0.822)	(0.823)	(0.593)	(0.597)	(0.805)	(0.988)
Euro	**-0.001****	**-0.001***	0.000	**0.000****	**0.000****	**-0.001*****	**-0.001*****	0.000	0.000
1999	**(0.044)**	**(0.083)**	(0.767)	**(0.026)**	**(0.023)**	**(0.000)**	**(0.000)**	(0.428)	(0.341)
EU 2004	**0.001*****	**0.001*****	0.000	0.000	0.000	**0.000*****	**0.000****	**0.002*****	**0.002*****
	(0.000)	**(0.000)**	(0.120)	(0.222)	(0.208)	**(0.047)**	**(0.048)**	**(0.001)**	**(0.000)**
fix $\Delta e_{€}$		0.022			-0.011		-0.029		**-0.285*****
		(0.578)			(0.772)		(0.539)		**(0.000)**
fix $\Delta e_{\$}$		**0.109*****			-0.054		**-0.071***		-0.070
		(0.000)			(0.233)		**(0.068)**		(0.390)
Adj. R^2	0.28	0.28	0.05	0.00	0.00	0.02	0.02	0.02	0.02
DW [b)]	1.6	1.6	1.9	1.7	1.7	2.0	2.0	2.0	2.0

[a)] The exchange rate is given in indirect quotation (foreign to domestic currency). Thus, a negative coefficient means that a depreciation (appreciation) of the domestic currency, or a decrease (increase) in the exchange rate, goes along with an increase (decrease) in share prices and vice versa. JAN, DEZ, Euro 1999, EU 2004 are the dummy variables as explained in Section 4. fix $\Delta e_{€}$ and fix $\Delta e_{\$}$ are the interaction terms between exchange rate fluctuation and the exchange rate regime.

[b)] Durbin Watson (DW) test

Stars refer to level of significance: * 10%, ** 5%, *** 1%

TABLE 4 Portfolio results for *exporting* firms and subsamples

	Russia			*CEEC-3*		
	1995-1999	*2000-2004*	*2005-2009*	*1995-1999*	*2000-2004*	*2005-2009*
r_D	**0.281*** (0.000)**	**0.391*** (0.000)**	**0.883*** (0.000)**	**0.976*** (0.000)**	**0.516*** (0.000)**	**0.806*** (0.000)**
Δe€	**0.093** (0.019)**	-0.017 (0.446)	0.012 (0.542)	**0.506*** (0.000)**	**0.241*** (0.000)**	**0.352*** (0.000)**
Δe$	**-0.499*** (0.000)**	**-0.280*** (0.000)**	**-0.382*** (0.000)**	-0.036 (0.498)	0.021 (0.345)	**0.117*** (0.000)**
Adj. R^2	0.539	0.166	0.441	0.629	0.442	0.648
DW [b)]	2.008	1.956	1.678	1.841	1.801	1.849

[a)] The exchange rate is given in indirect quotation (foreign to domestic currency). Thus, a negative coefficient means that a depreciation (appreciation) of the domestic currency, or a decrease (increase) in the exchange rate, goes along with an increase (decrease) in share prices and vice versa. For the sake of brevity the constant and the coefficients for the dummies are not reported.

[b)] Durbin Watson (DW) test

Asterisks refer to level of significance: * 10%, ** 5%, *** 1%

TABLE 5a Exchange rate exposure for single stocks of e*xporting* firms[a)]

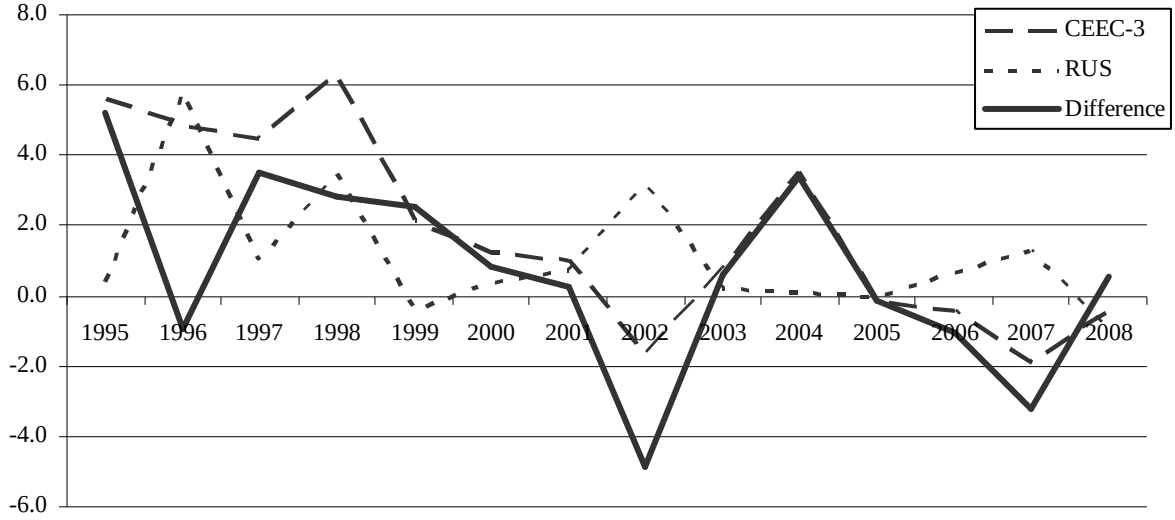
	Coefficients of the GJR (1,1) regression (Tab.3)					
	Mean	Median	Min	Max	positive (significant)	negative (significant)
Russia						
EUR	0.043	-0.017	-0.217	1.681	13 (2)	17 (4)
USD	-0.301	-0.350	-0.747	1.658	2 (1)	28 (25)
CEEC-3						
EUR	0.265	0.241	-0.073	1.107	19 (18)	2 (0)
USD	0.020	0.015	-0.173	0.222	12 (8)	9 (4)

TABLE 5b Exchange rate exposure for single stocks of d*omestic* firms[a)]

	Coefficients of the GJR (1,1) regression (Tab.3)					
	Mean	Median	Min	Max	positive (significant)	negative (significant)
Russia						
EUR	0.013	0.011	-1.141	0.615	30 (16)	28 (14)
USD	-0.303	-0.327	-0.736	0.276	6 (4)	52 (43)
CEEC-3						
EUR	0.273	0.303	-0.050	0.818	31 (24)	2 (0)
USD	0.023	0.000	-0.142	0.337	16 (7)	17 (6)

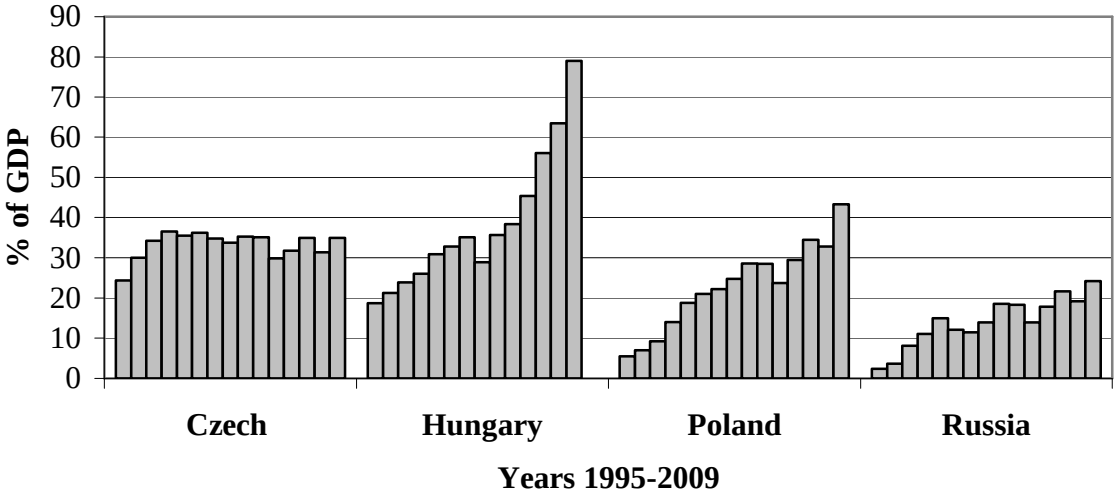
[a)] The exchange rate is given in indirect quotation (foreign to domestic currency). Thus, a negative coefficient means that a depreciation (appreciation) of the domestic currency, or a decrease (increase) in the exchange rate, goes along with an increase (decrease) in share prices and vice versa.

FIGURE 1. Inflow of portfolio investments in equity in % of market capitalization



Source: EBRD, World Bank

FIGURE 2. Private sector external debt in % of GDP [a) b)]



Source: National Central Banks, EUROSTAT, IMF

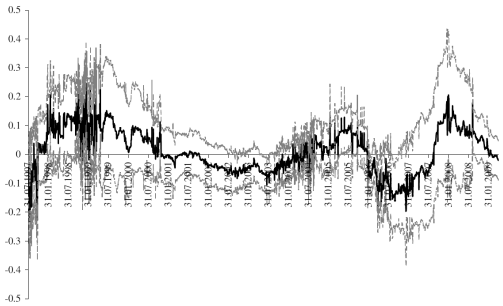
[a)] Private Sector External Debt is calculated as the difference of the Gross External Debt (as it is defined by international organizations IMF, OECD, World Bank) and Public Sector External Debt (including General Government, Monetary Authorities, and other non-financial or financial corporations which are subject to control by government and monetary authorities). Thus, Private Sector External Debt excludes equity and financial derivative instruments from external debt.

[b)] For Hungary, the data for 2009 was not yet available.

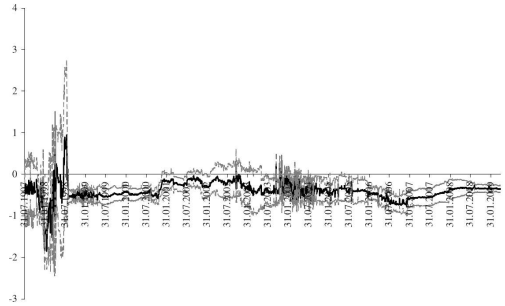
FIGURE 3a Rolling regressions for exposure of e*xporting* firms

Russia

EUR

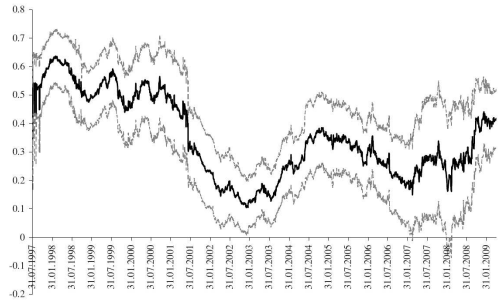


USD



CEEC-3

EUR



USD

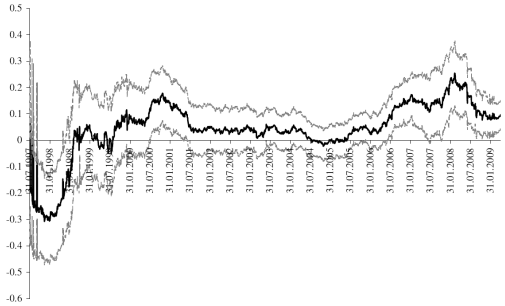
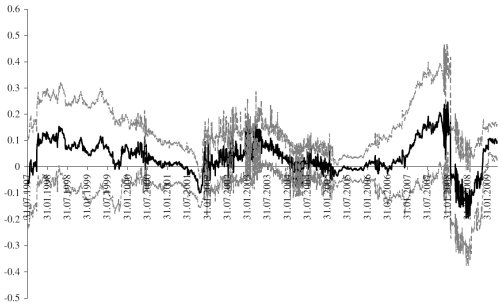


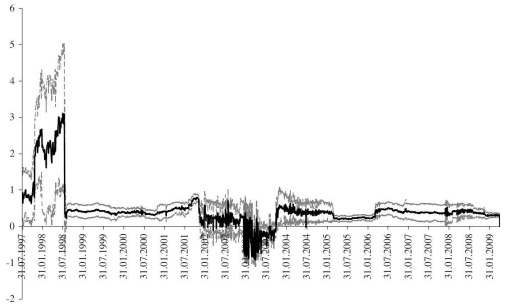
FIGURE 3b Rolling regressions for exposure of *domestic* firms

Russia

EUR

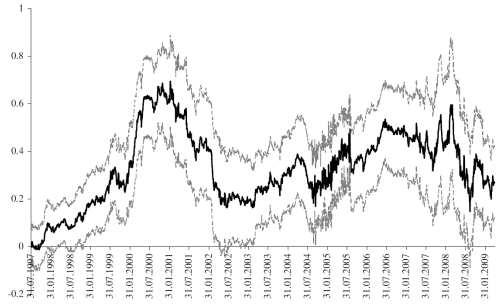


USD



CEEC-3

EUR



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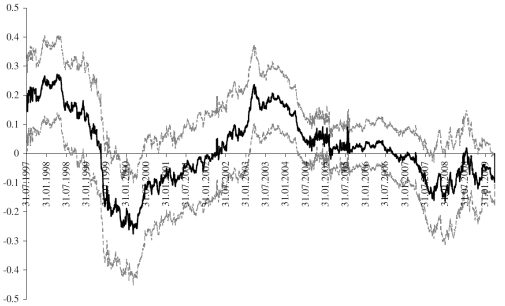

Note: The figures display the evolution of the coefficients $\gamma_{t,€}$ and $\gamma_{t,\$}$ respectively for a rolling regression over a window of 500 observations.

Appendix TABLE A.1 Information on exporting companies (data is taken from annual reports 2008)

[a)] Export share is given as % of total sales in 2008. If this data was not available, the information in "About the company" (see italic marking) taken from the respective company's homepage discloses why the respective company has been defined as an exporting firm.

Name Code	Sector	About the company	Export share[a)]	Export to:
Czech Republic				
PEGAS NONWOVENS CZ:PEN(P)	Nonwoven textiles	Production of synthetic nonwoven textiles from polypropylene or polyethylene filaments	80%	Western Europe, Central and Eastern Europe, Russia, other
PHILIP MORRIS ČR CZ:TAB(P)	Tobacco products	Leading international tobacco company. 15.6% share of the international cigarette market outside of the USA in 2008.	59%	160 countries
SPOLEK CHEM.HUT.V. CZ:SPC(P)	Chemicals	The Company exports and imports a significant portion of products (chemical substances and chemical preparations) and raw materials and is therefore significantly exposed to foreign exchange risk arising from various currency exposures primarily with respect to the Euro.	85%	UK, USA, Western Europe, (Germany, Netherlands, France, Italy, , Sweden, Great Britain, Austria, Switzerland, Spain, Belgium), Poland, Slovakia, Turkey
UNIPETROL CZ:UNP(P)	Crude oil processing, production of petrochemical products	Production and sale of refinery products, chemical and petrochemical products, polymers, fertilizers, and specialty chemicals, retail distribution of motor fuels. Business based on exports and imports was significantly affected by the trends in currency exchange rates. Since 2005, part of Central Europe's largest refining and petrochemical group, PKN Orlen.	44% (2006), 29% (2007)	Central and Eastern Europe (Poland, Slovakia, Germany, Austria, Czech Republic)
Hungary				
EGIS HN:EGI(P)	Pharmaceuticals	Manufacture and distribution of generic drugs and their active ingredients. In December 1995, France s Servier SAS acquired 50.9 percent of the company shares.	approx. 60%	CIS states, other Eastern European countries, Western Europe, USA
LINAMAR HN:LMH(P)	Engineering and machinery	One of the largest Hungarian agricultural machinery manufacturers. Also manufactures and distributes harvesting equipment, precision-made parts, primarily to the automotive industry. A subsidiary of the Canadian Linamar Corporation.	88%	European Union and non-EU, North America, other
MOL HN:MMG(P)	Oil and natural gas industry	Major Central European company in the integrated oil and gas industry and largest enterprise in Hungary (turnover), founded in 1991. Dominant shareholder in Slovnaft, the leading Slovakian oil industry company (proportion of shares 98.4% in 2004), also of the Croatian company INA (25% in 2003). Market leader in its main activities both in Hungary and Slovakia. A substantial part of MOL s natural gas division has been sold, except for its natural gas transportation division. Strategic partnership with Gazprom since 2006.	57%	Operation in 10 Eastern European and Asian countries

PANNERGY HN:PAN(P)	Renewable energy, packaging industry	Investment and operating activities in the renewable energy resources sector, primarily geothermal energy. Plastic processing mainly for packaging industry, manufacturing of composite insulator.	58%	European Union (also Ukraine, Serbia)
RICHTER HN:RIC(P)	Pharmaceuticals	Manufacturing and distribution of active ingredients and generic pharmaceuticals. Since 1997, the largest domestic drug manufacturer.	81%	European Union, USA, CIS, Japan, other
TVK HN:TVK(P)	Chemicals	Production of ethylene and propylene from purchased naphtha and gasoil. A member of the MOL Group (94.86% of the company shares are owned indirectly by MOL). Legal predecessor was founded in 1953. One of the biggest integrated olefin and polyolefin producers in Europe.	48%	Germany, Italy, Poland, Austria, UK, France
Poland				
AMICA PO:AMI	Electro-engineering	Manufacture of cookers, launch, heating equipment. One of the most modern washing machine factories in Europe. Danish manufacturing and trading company.	over 50%	Eastern and Scandinavian market
BIOTON PO:BIO(P)	Pharmaceuticals, chemcals	Pharmaceutical enterprise that produces modern medicine: recombined human insulin and antibiotics.	41% (2007); 32% (2008)	Present on 5 continents, in particular in Russia, Asia and Chinese market (also Euro-zone and CEEC)
BUDIMEX PO:BUX	Construction	Exports of construction services primarily to the developing markets of Asia and Africa and the COMECON. A leading construction company in Poland. A joint stock company. The Ferrovial Group, our strategic investor based in Spain, has been holding more than 50% of our share capital and votes in the General Meeting since 2000. The fusion of the investing capacity, know-how, market position, and international experience of Ferrovial with our contacts in Poland and CEE markets provided us with new opportunities and helped to expand into other business areas.	80%	Germany (also Russia, Belarus and Ukraine (3%))
CERSANIT PO:CER(P)	Building materials	Industry Building materials: national leader in the area of complex bathroom outfitting, strongly expanding the range of its export activity. Production and sales of sanitary ware products, ceramic tiles, shower cabins, acrylic bathtubs, acrylic wading paddles, bathroom furniture as well as other bathroom fixtures.	40%	
DEBICA PO:DEB	Automobiles	Automobiles: the leading Polish maker of passenger and commercial tires, all-steel truck tires, off-road tires, for agricultural machinery and other products from the tire industry.	76%	Germany, Slovenia, France, Russia, Italy, England, Romania, Spain and United Arab Emirates, also UK, USA, Brazil (60 countries)

KABLE HOLDING PO:SLA	Electro-engineering	With manufacturing facilities in Denmark, Germany, Norway, the Czech Republic, Poland and China and sales offices all over the world, nkt cables is a market oriented, highly technological cables manufacturer with global ambitions. Provider of numerous consulting and engineering services. Owned by Danish NKT Holding A/S.	80%	Eastern Europe, Germany, Denmark, Asia, other
KETY PO:KET	Metals	Aluminium industry. *Exports 33% of its products*.		All countries in Europe and several ones in the world
KGHM PO:KGH(P)	Metals	KGHM is one of the largest Polish exporters, the 7th-largest copper producer and the 3rd-largest silver producer in the world. The electrolytic copper produced by KGHM is registered by the London Metal Exchange as "Grade A". It produces also gold, lead, sulphuric acid and rock salt.	70%	China, France, Germany and the Czech Republic for copper. Great Britain, Belgium, Germany, USA for silver.
MONDIE SWIECIE PO:MPP	Wood & paper	High quality containerboard and sack paper producer. One of five major packaging paper producers for European paper sack and corrugated board industries**.**	74%	Benelux, Great Britain, France, Sweden, other
POLIMEXMS PO:PXM(P)	Construction and installation services	*One of the biggest* manufacturers and *exporters of steel products* and platform gratings *in Poland*, leader in the Polish engineering and construction sector. General contractor in the following sectors: power engineering, chemical, petrochemical and environmental protection.		European market
STOMIL PO:SAN	Chemicals, automobiles	*An enterprise active on European markets*. Producer of rubber, rubber to metal goods, rubber to plastic and TPE goods used in car body sealing systems, car suspension and exhaust suspension systems, electrical, power transmission, fuel and cooling systems.:		Germany, Belgium, Belarus, Russia, other.
Russia				
ACRON RS:ACR	Chemical production	A leading Russian and global mineral fertiliser producer (multi-nutrient fertilisers such as NPK and bulk blends, as well as straight nitrogen-based products such as urea, ammonium nitrate and UAN).	70%	China, Latin America, Asia, former USSR (over 50 countries)
CHELYABINSK MTL.PLT. RS:CMF	Metals and mining	Part of Mechel's steel business. Mechel is one of the leading Russian mining and metals companies (mining, steel, ferroalloys and power), the largest Russian producer of special steel, the second largest Russian producer of long steel products as well.	46%	
GAZPROM RS:GAZ	Oil & gas, natural gas sales	The world's largest natural gas company controlling a quarter of the world's total gas reserves. Key supplier of gas to Europe and the CIS, engaged in several transcontinental gas infrastructure projects. Russia's largest company by turnover and market capitalisation. 50, 01% state-owned. Supplies approx. one third of Western Europe's total gas imports (about 60% of revenues).	60%	Germany, Italy, Turkey, France, CIS (32 countries)

GAZPROM NEFT RS:SIB	Oil & gas, oil sales	One of the largest oil and gas producing companies in Russia. The main areas of Gazprom Neft's business activity include oil and natural gas production, oil and gas field facility services, oil refining and marketing of petroleum products. The proven reserves of the company exceed 6,9 billion barrels, which ranks the company *amongst the world's twenty largest oil companies.*		Germany, Italy, Turkey, France, CIS (32 countries)
IRKUT RS:SPC	Machinery	Aircraft-manufacturing corporation, capable of accomplishing research-and-development, manufacturing, after-sales support, and upgrades of top-of-the-line aircraft ranging from civil and military aircraft to avionics and ground equipment. Accounts for over 15% of Russia's defense export. *The best Russian Exporter 2008.*		37 countries
MAGNITOGORSK IOSTL.WORKS RS:MAG	Metals and mining	The Magnitogorsk Iron and Steel Works Open Joint Stock Company (MMK) is one of the largest enterprises of the Russian steel sector accounting for about 20% of all steel products sold on the Russian market. *50% of products are sold in the export.*		South East Asia, Middle East, Africa, Belarus, Ukraine, Kazakhstan, other CIS states (60 countries)
MECHEL OAO RS:MSG	Metals and mining	One of the leading Russian mining and metals companies (mining, steel, ferroalloys and electric and heat power). *Russia's largest exporter of coking coal concentrate*. Second largest producer of coking coal in Russia, controls 23% of the coking coal washing capacity in Russia. Subsidiaries in Kazakhstan, USA, Romania, Bulgaria and Lithuania. *Products are sold in Russia as well as on international markets*. Mechel is the only coal mining and metals company in the region of Eastern and Central Europe and Russia having its shares placed on the New York Stock Exchange.		International markets (Kazakhstan, USA, Romania, Bulgaria and Lithuania)
MMC NORILSK NICKEL RS:GMK	Metals and mining	Mining and Metallurgical Company Norilsk Nickel (hereinafter - MMC Norilsk Nickel or the Company) and its subsidiaries (hereinafter - the Group) is the *world's leading producer of nickel and palladium,* and one of the *largest global producers of platinum and copper*. The Group also produces a variety of by-products, such as cobalt, rhodium, silver, gold, iridium, ruthenium, selenium, tellurium and sulfur. The world's leading producer of nickel, copper, and palladium, among other strategic metals. One of the most international of the Russian companies.		Australia, Botswana, Finland, the United States of America and South Africa.
NIZHNEKAMSKNEFTEKHIM RS:NKN	Oil, chemical production	High-tech petrochemical company producing rubber, plastics, monomers as feedstock to produce rubber and plastics, other petrochemical products.	53%	Europe, South-East Asia, America (50 countries)
NOVATEK RS:NTV	Oil & gas	*Russia's largest independent gas producer* and second-largest natural gas producer. Russia's leading independent gas producer. 25% owned by Gazprom. Responsible for a major part of Russia's gas production growth in recent years. Some 5% of Russia's gas production and a similar share of gas reserves. Securing access to Gazprom-controlled gas transportation infrastructure and *to export pipelines* in particular.	72% (2007), 64% (2006)	

NOVOLIPETSK STEEL RS:NFM	Metals and mining	One of the world's largest steel producers. An integrated steel-making company, we produce pig iron, slabs, hot-rolled, cold-rolled, galvanised, pre-painted, transformer and dynamo steel. It has won the 2007 Best Russian Exporter contest in the category of Ferrous Metals Best Exporter in the Industry.	90% (2007)	Europe, the Americas, Asia, Africa and the Middle East (70 countries)
NVYSK.COML.SEA PORT RS:NVR	Transport	Novorossiysk Commercial Sea Port ("NCSP") is a multi-purpose Russian stevedoring and port services company and Russia's largest commercial sea port operator, according to Global Insight/ISL. NCSP is a key gateway for shipment of a wide range of Russian import and export cargoes, handling approximately 20% of Russia's exports and imports shipped via sea port during 2006, according to the Association of Russian Sea Ports. NCSP operates primarily at the Port of Novorossiysk (the "Port"), a multi-purpose, year-round, deep-water port located on the Russian shore of the Black Sea.	48%	
OC ROSNEFT RS:RSF	Oil & gas	Leader of Russia's petroleum industry, ranks among the world's top publicly traded oil and gas companies. Russia's largest oil producer (also by market capitalisation), 100% state-owned. Acquired the core of the former oil company Yukos' assets in 2005. 25% of Russia's oil output, 2-3% of the world's reserves.	62%	Europe, CIS
OGK-2 RS:WHL	Electric utilities	The Open Joint-Stock Second Generation Company of the wholesale electricity market, abbreviated title: JSC "OGK-2". *Exporting electricity to neighbouring CIS countries and along a transit route to Western-European countries.*		Western-European and neighbouring CIS countries (Georgia and Azerbaijan)
OMZ URALMASH IZHORA GP. RS:UMA	Production sector	OMZ (Uralmash-Izhora Group) is the largest heavy industry company in Russia. It specializes in engineering, production, sales and maintenance of equipment and machines for the nuclear power, oil and gas, and mining industries, and also in the production of special steels and equipment for other industries.	over 50%	Asia, Europe, CIS
LUKOIL (JSC) RS:LKO	Oil & gas	The 6th largest non-state publicly traded oil company worldwide by production of hydrocarbons. Russia's 2nd largest oil producer. 2-3% of global oil reserves, 2.3% of global oil production, 20% of Russia's oil output. The company with second largest trading volumes among foreign companies traded on the London Stock Exchange (IOB) in 2008. The only private Russian oil company whose share capital is dominated by minority stakeholders. The most international among the Russian companies. Russia's largest oil exporter.	aprox. 64%	CIS, the Baltic States, Finland, South-Eastern Europe, other
POLYMETAL RS:POL	Metals and mining	Polymetal is a leading precious metals mining company. Polymetal is one of the top ten silver producers in the world and the largest in Russia.	72%	

POLYUS GOLD RS:PYG	Metals and mining	Polyus Gold (Open Joint Stock Company, OJSC) is a leading gold producer. The sales structure changed significantly. 2006: export accounted for almost 30% of sales. 2007: gold was largely sold in the domestic market to Russian banks (87% of sales). The increase of sales in the domestic market is explained by more favorable contracts terms concluded with Russian banks.	30% (2006)	Credit Suisse (Zurich, Switzerland)
RASPADSKAYA RS:RAS	Metals and mining	Raspadskaya is a compact integrated coal mining and enrichment complex. One of the leading suppliers to the largest Russian smelters, including Novolipetsk Steel, Magnitogorsk Iron & Steel Works and Nizhniy Tagil Iron & Steel Works.	approx. 32 %	Eastern Europe (Ukraine, Romania, Hungry, Bulgaria), South-Asia (India, Japan and South Korea)
SEVERSTAL RS:CHM	Metals and mining	The 12th largest steel producer in the world, a steel leader in Russia and the CIS. Integrated steel and mining business model worldwide, mining segment is one of Russia's three largest producers of iron ore concentrate (with a market share of 9.1%), pellets (30%) and coking coal (14,7%). The company's revenues grew by nearly 50% in 2008, the strongest performance among the key Russian metal companies. Through a series of acquisitions in 2008, Severstal entered the gold mining industry and aims to become one of the leading producers in Russia.	53%	Europe and Asia; USA, Central and South America, Africa, Middle East, Europe, Central and South East Asia
SLAVNEFT MEGIONNEFTEGAZ RS:MFG	Oil & gas	The Group's principal activities are the extraction, production of oil and gas	47%	
SURGUTNEFTEGAS RS:SNG; SURGUTNEFTEGAZ PREF. RS:SNP	Oil & gas	One of the largest oil companies in Russia. Prospecting, gas- and oil-field construction and development, oil and gas production and marketing, oil and petrochemical products producing and marketing come within the scope of the company's activities. *Export of crude oil and petroleum products: 55% and 61% in 2006.*		CIS and Western Europe
TMK OAO RS:TUE	Production sector	One of the world's largest oil and gas pipe producers and the market leader of the Russian pipe industry. Shipments of longitudinal welded large-diameter pipes for the Russian part of the Eastern Siberia–Pacific Ocean (ESPO) oil pipeline spur to China. TMK is *Russia's largest exporter of pipe products*, accounting for about 52% of all Russian steel pipe exports.		Europe, Middle East, North Africa, South and South-East Asia, CIS (over 60 countries)
TRANSNEFT PREF. RS:TRP	Oil & gas, oil transporting.	Transneft is Russia's primary crude oil export channel. Its network is fully interconnected with the European pipeline system.	approx. 60%	Ukraine, Belarus, Baltic countries, North America and Europe
UDMURTNEFT PREF. RS:UDP	Oil & gas	Largest oil-producing enterprise in the Udmurt Republic. Holds 60 hydrocarbon exploration and production licenses. Rosneft indirectly holds 49.51% in Udmurtneft.	63,6%	China, Europe

UFA ENGINE PLANT RS:UFM	Production sector	Production and service of the turbo-jet aviamotors.	over 70%	49 countries (e.i. Vietnam)
URALKALIY RS:URK	Chemical production	One of the world's leading producers of potash fertiliser and one of Russia's largest chemical companies. Primarily an export business. Sales to customers in Russia account for around 10% of production. Leading market position in developing markets.	89%	China, Brazil, South-East Asia and India, also Europe, Africa, the Middle East and USA
VSMPO RS:VS	Metals and mining	The world's largest manufacturer of titanium - ingots and all kinds of semi finished items from titanium alloys. *More than three quarters of company output is exported* mainly to large world aircraft manufacturer such as Boeing, EADS/Airbus, General Electric.		more than 350 firms in 50 countries
WIMM-BILL-DANN FOODS RS:WBD	Food industry	Market leader in dairy products and children's food in Russia and one of the *leading players in the market* for non-alcoholic drinks in Russia *and the CIS*. A three-time recipient of "*The Best Industry Sector Exporter*" award of the Russian Ministry of Economic Development. Export of "Essentuki" mineral water. Around 280 million people in Russia, Ukraine, Belarus and the countries of Central Asia buy Wimm-Bill-Dann's products		USA, Canada, France, China, Mongolia, Israel, Latvia, Estonia, Lithuania, Moldova, Ukraine, Belarus, Kazakhstan, Georgia, Armenia