

Exchange Rate Effects in a Globalized Economy: Evidence from the Czech Republic¹

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Abstract

The effects of nominal exchange rate fluctuations on profitability of domestic private firms and foreign-owned firms which operate in the Czech Republic are separately examined in the period from 1998 to 2006. We find out that exchange rate changes have diverse effects on the two sectors. Specifically, domestic private firms absorb exchange rate changes in their profit margins while foreign-owned firms are resistant against exchange rate changes. We ascribe the resistance of foreign-owned firms to transfer pricing strategies of multinationals. One determinant of a multinational company price strategy is different taxation in countries of its operation. That is the reason for concentration of gross profits in low taxed countries by manipulating intrafirm prices. As a result these optimization strategies have adverse effects on a macroeconomic level causing ineffectiveness of the exchange rate adjustment mechanism and distortions in both foreign trade and GDP statistics.

Keywords: branding, exchange rate fluctuations, multinational company-related trade, operational profitability, tax optimization

JEL Classification: F23; L11

1. Introduction

Foreign direct investment (FDI) as a form of private capital investment started to penetrate the world economy only in the 1980's. Although a vast amount of FDI still proceeds mostly within developed countries, FDI has been the symbol of the economic restructuring and success in transition countries of Central

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¹ The opinions in this article are of the author and are not necessarily endorsed by the Czech National Bank. The article draws on the author's Ph.D. dissertation thesis. I would like to thank the two anonymous referees for helpful comments.

and Eastern Europe. The Czech Republic in particular has been often appraised as a successful example of FDI inflows.

On the one side, positive FDI effects are examined in the literature (boost to exports and economic growth in general or positive spillovers on the domestic sector in host countries). Barrell and Holland (2000) demonstrate a positive FDI effect on labor productivity growth in the manufacturing industry in the Czech Republic, Hungary and Poland using empirical analyses. Weil (2003) shows a positive effect of foreign ownership on the banking sector cost effectiveness. The role of FDI in the process of economic restructuring in European transition countries was examined among others by Benáček (2000), Jarolím (2000) or Srholec (2003).

On the other side, the aging of existing FDI stocks implies increasing profit outflows from the host economy which cause deterioration of the current account. The profitability life-cycle of direct investment has been therefore examined by Brada and Tomšík (2003; 2004); Novotný (2004); Altzinger (2006); Mandel and Tomšík (2006); Novotný and Podpiera (2008).

Contrary to prevailing literature on FDI, this paper deals with another economic phenomenon which is related to FDI. This phenomenon stems from the export orientation of manufacturing FDI. We draw from Benvignati (1990) who remarks that external trade of the economy which is characterized by a high stock of FDI relative to GDP requires more complex analysis. The reason is a growing role of the multinational company-related trade, or intrafirm trade. Intrafirm transactions of multinational companies are assumed not to be valued in an open market, rather, multinational companies choose, within certain limits, an optimal transfer price. This is defined as a price settled between two related or affiliated parties that is conducted as if they were unrelated, so that there is no question of a conflict of interest.² The determinants of transfer (or intrafirm) prices are represented, for example, by differences in taxation among countries or by the existence of customs duties (Horst, 1971).

The evidence of a high proportion of intrafirm trade on the total world trade is documented by, for example, Neighbour (2002). Accordingly, Clausing (2003) finds (by analyzing US foreign trade prices) direct evidence indicating that prices charged within a multinational company are driven by tax-optimization

² Initially, Cook (1955) and Hirshleifer (1956) dealt with the problem of pricing the goods and services that are exchanged between mutually related divisions within a firm. Hipple (1990) gives four definitions of multinational company-related trade. His narrowest definition comprises transactions between a parent company and its affiliates only. Nevertheless, it is very difficult to monitor the narrow intrafirm trade. Commonly, a broader definition which includes all trade transactions where a parent firm or an affiliate participates as a buyer and/or seller is used. The broader definition is used by the U.S. Bureau of Economic Analysis to calculate the level of merchandise trade associated with U.S. multinational companies.

strategies. Furthermore, in the case of the Irish economy, Barry (2005) claims that multinational companies are engaged in profit manipulation through prices charged for the transfer of goods and services between a parent company and its foreign affiliates.

Due to the growing importance of intrafirm trade, the OECD (2001) even introduced guidelines which aim to regulate international transfers of goods and services within a multinational company. Subsequently, national statistical offices have started to adjust trade balances for so-called branding activities, which are de facto transfer pricing activities within a multinational company.

The price strategies of multinational companies at a microeconomic level are reasonable but they entail distortions at a country macroeconomic level. The Czech Republic is a typical example of a country with a high share of FDI stock and, accordingly, with a high share of multinational company-related trade to total foreign trade. We estimate that the share of multinational company-related trade is higher than 50% in the case of the Czech economy. A survey analysis conducted by Babecky, Dybczak and Galuscak (2008) suggests that 25% of Czech exporters do not have their own pricing policy but prices on foreign markets are determined by a mother company.

In this paper, we empirically demonstrate the effect of multinational company-related trade by examining reactions of foreign-owned firms (affiliates of multinational companies) and private domestic firms to nominal exchange rate fluctuations of the Czech Koruna. Using accounting data of exporting manufacturing branches we find out that while exchange rate changes are reflected in profitability of domestic private firms, the profitability of foreign-owned firms is more resistant to exchange rate changes. We ascribe the diverse reaction of foreign-owned firms to exchange rate changes to the tax optimization strategy of multinational firms.

Practically, it means that multinational companies concentrate their gross profits in a low taxed country at the expense of high tax countries, irrespective of nominal exchange rate fluctuations. We show that differences in taxation exist even among individual EU countries. A multinational company sets higher export prices, and at the same time lower import prices, on its multinational company-related trade in a country with relatively lower taxation to achieve this goal. Whereas domestic private firms which have no property links to a multinational company are forced to absorb short-term exchange rate fluctuations in their profit margins to preserve existing foreign market shares.³

³ In the case of a domestic currency appreciation, a domestic private firm has two options: they can either absorb a domestic currency appreciation in its profit margin or increase the foreign price (in euro) of its products with a risk that it will lose its existing foreign market share.

Consequently, the pricing strategies of multinational companies cause incompleteness of the exchange rate adjusting mechanism and overvaluation of foreign trade and therefore GDP in low taxed countries at the expense of high taxed countries (branding). The main contribution of this paper is to shed light on these processes and thus make the interpretation of macroeconomic variables in countries with a high share of FDI more comprehensible.

The rest of the paper is organized as follows: In part 2, the proposed hypothesis and the data are described. Part 3 is devoted to empirical results and their interpretation and last part concludes.

2. Tested Hypothesis and Data

Regarding the methodology, we assume that exporting manufacturing firms in the Czech Republic apply the pricing-to-market strategy (Krugman, 1986), i.e. nominal exchange rate fluctuations are not fully reflected in foreign export prices but they are absorbed in firms' profit margins. According to Betts and Devereux (2000) firms tend to set their prices in the currency of a destination market and do not adjust their prices for exchange rate changes. In this way, firms stabilize their real exports and foreign market shares regardless of nominal exchange rate fluctuations. This assumption seems plausible given the periods of increased volatility of the Czech Koruna (mainly on the appreciation side) which have not been followed by a corresponding adjustment of the trade balance.

This assumption is also supported by a high share of Czech exports to the Euro area on total Czech exports (67% in 2009 according to the IMF statistics). Given the relative size of both the Czech economy and the Euro area economy it is likely that the euro currency serves as the invoicing currency for Czech exporting firms.

The implied methodology is derived from Horst (1971) and Krugman (1986) who suppose that a monopolistic producer decides to sell his products for different prices on separate foreign markets. Consequently, foreign prices do not react to exchange rate changes but, on the contrary, exporting firms absorb exchange rate fluctuations in their profit margins.

Nevertheless, Dornbusch (1987) refers to the absence of a comprehensive matched data set of export, import, and domestic prices. If we therefore intend to identify price strategies of exporting firms, we need to accept some simplifying assumptions. In our case, the indicator of the operational profitability of sales is employed to demonstrate short-term effects of exchange rate fluctuations on firms' profit margins. Moreover, by using operational profitability, profits and losses from financial operations (hedging against the currency risk) are subtracted.

We use aggregate accounting data from the database of economic results of non-financial firms with more than one hundred employees. The database is compiled by the Czech Statistical Office (CSO). Aggregate data for each industrial branch (OKEC/CZ-NACE) and institutional sector (foreign-owned firms, domestic private firms and domestic public firms) are available.

As we are particularly interested in exporters' behavior, we have selected the industrial branches which are characterized by more than 60% of exports on their total production. The share of the value added of exporting branches on the total value added of the manufacturing industry was 55% in 2006. Furthermore, if we utilize the data from the Czech National Bank's Annual Report on FDI we find that foreign-owned firms account for about one-half of total Czech exports.

The exporting manufacturing branches in our sample comprise: manufacturing of textiles, textile products and clothing industry (DB), manufacturing of leather and leather products (DC), manufacturing of wood and furniture products out of wood (DD), manufacturing of chemicals, chemical products and man-made fibers and pharmaceuticals (DG), manufacturing and repairs of machinery and equipment (DK), manufacturing of electrical and optical appliances and equipment (DL), manufacturing of transport vehicles and equipment (DM) and manufacturing of unclassified products (DN). The data are in nominal values denominated in Czech currency and are available in quarterly frequency beginning in the first quarter of 1998 to the fourth quarter of 2006.

In total, we have 32 observations of year-on-year changes in the operational profitability of the eight exporting manufacturing branches mentioned above. The average yearly change in the profitability rate of domestic private firms was 0.2 percentage point with a standard deviation of 3.9 percentage points while, in the case of foreign-owned firms, it was -0.1 percentage point with a standard deviation of 6.0 percentage points. The average nominal exchange rate appreciation during the observed period was 4.5% with the same standard deviation (see Table 1).

Table 1
Descriptive Statistics of Variables in Equation 2

	Mean	Max	Min	Std. Dev.
$\Delta\pi_i^f$ y/y (foreign-owned firms) in percentage points	-0.1	23.8	-22.4	6.0
$\Delta\pi_i^d$ y/y (domestic private firms) in percentage points	0.2	15.7	-12.7	3.9
Δz_t y/y in %	4.5	16.6	-4.0	4.5
Δgdp_t y/y in percentage points	-0.8	2.5	-4.2	1.6
Δppi_t y/y in percentage points	1.1	8.7	-6.6	3.6

Source: Czech Statistical Office; Thomson Reuters Datastream; own calculations.

Operational profitability is calculated in the following way:

$$\pi_t^i = \frac{\Pi_t^i}{S_t^i} \quad (1)$$

π_t^i is the operational profitability of the exporting manufacturing branch i in time t . Π_t^i stands for the operational profit and S_t^i for the firms' sales. π_t^i is calculated separately for private domestic firms and foreign-owned firms. The hypothesis is tested using the following linear function:

$$\Delta\pi_t^i = \alpha^i + \beta\Delta z_t + \gamma\Delta\pi_{t-1}^i + \delta\Delta gdp_t + \varphi\Delta ppi_t + \varepsilon_t \quad (2)$$

where parameter α^i denotes the specific effect of profitability in industrial branch i . All variables are in year-on-year changes and are stationary. Variable Δz_t stands for a year-on-year change of the nominal effective exchange rate (NEER) of the Czech Koruna.⁴ By including NEER we test how exchange rate fluctuations are reflected in operational profitability. In line with our assumptions, it is supposed that an increase in z_t , which means appreciation of the Czech Koruna, causes a decline in π_t^i and vice versa. Of course, exchange rate fluctuations will probably affect diversely different manufacturing branches. As mentioned before our aim is to examine whether the two institutional sectors (private domestic firms and foreign-owned firms) react differently to exchange rate changes.

Therefore we estimate equation 2 separately for each institutional sector. The lagged dependent variable $\Delta\pi_{t-1}^i$ and two control variables Δgdp_t and Δppi_t are included. Δgdp_t is for year-on-year change in relative yearly dynamics between effective Euro area GDP⁵ and Czech GDP. It is assumed that higher GDP growth abroad compared to Czech GDP growth has a positive effect on profitability of local exporting firms. Similarly, Δppi_t represents year-on-year change in relative yearly dynamics between effective Euro area industrial producer prices and Czech industrial producer prices. We assume that higher foreign price growth causes an increase in profitability of Czech exporters. This is because we presume that the production of Czech exporters is invoiced in the foreign currency (Euro) and an increase in foreign prices has therefore a positive effect on profitability of exporters. β , γ , δ and φ are corresponding parameters. The i.i.d. disturbance is denoted by ε_t .

⁴ A flexible exchange rate regime was introduced in the Czech Republic in 1997.

⁵ The effective Euro area indicator is weighted by the share of each Euro area country of Czech exports. Effective Euro area GDP is used as a measure of foreign demand for Czech exports.

3. Estimation Results

We estimated equation 2 separately for foreign-owned and domestic private firms using the fixed effects panel data estimator on a sample of 248 observations. The results are shown in Table 2. In the case of domestic private firms, the model explains nearly one third of year-on-year profitability changes. Moreover, all coefficients (including the fixed effect) are statistically significant at the 1% significance level. In the case of foreign-owned firms the results are less convincing. The coefficient of determination is low and the lagged dependent variable and relative industrial producer prices are statistically significant only. Nevertheless, all coefficients have their signs in accordance with our assumptions.

Table 2

Fixed Effects Estimation Results

	Foreign-owned firms	Domestic private firms
Intercept	0.18 (0.63)	2.4*** (0.38)
β	-0.09 (0.09)	-0.45*** (0.06)
γ	0.23*** (0.06)	0.16*** (0.06)
δ	0.19 (0.28)	0.45*** (0.16)
ρ	0.2 (0.11)*	0.16*** (0.06)
Adjusted R ²	0.04	0.3
D.W.	2.01	2.1

Sample (adjusted): 1999Q1 – 2006Q4; Periods included: 31; Cross-sections included: 8; Total panel (balanced) observations: 248.

Standard errors are given in parentheses. Asterisks denote significance as follows: *** 1%, and * 10%.

Source: Czech Statistical Office; Thomson Reuters Datastream; own calculations.

According to our assumptions, nominal exchange rate appreciation causes a decrease in the operational profitability (negative sign of the coefficient β). Nevertheless, β is statistically significant only in the case of domestic private firms. One percent appreciation of the exchange rate implies the decrease in the operational profitability of 0.45 percentage point.

If we look at the coefficient γ , intuitively, an increase of the profitability rate in the current quarter implies its increase in the next quarter as well, and this effect is statistically significant in both foreign-owned and domestic private firms. Both coefficients for relative GDP growth and PPI inflation are statistically significant in the case of domestic private firms and although having same signs, relative PPI inflation is statistically significant (at the 10% significance level) only in the case of foreign-owned firms. Relatively higher GDP growth in the Euro area causes higher profitability of Czech exporters, and the same is valid for relative PPI inflation which is in accordance with our assumptions.

Generally, the analysis unveils that nominal exchange rate fluctuations affect economic results of domestic private firms at the 1% significance level while it seems that foreign-owned firms are resistant against exchange rate fluctuations.

Given the results in Table 2, we assume that multinational companies which consist of foreign owned firms located in different countries are able to manipulate their intrafirm prices of both the production consumption (import prices in national statistics) and the final output (export prices in national statistics).

Among factors which determine manipulation of the multinational company-related trade is tax optimization (Copithorne, 1971; Horst, 1971; Bond, 1980). Tax optimization proceeds in such a way that a multinational company has two sets of accounting books: one is for real transactions and the other is for tax purposes. A simple way to maximize global profit is that affiliates located in a low tax country charge the intracompany price above the marginal cost of production to affiliates located in a high tax country and vice versa. Similarly, an affiliate located in a high tax country will charge as low as possible intracompany price of production consumption (intermediate products) to an affiliate located in a low tax country and vice versa.

As a result, affiliates in a lower tax country will maximize their value added and gross profit, respectively, at the expense of affiliates located in a high tax country. Higher net profit gained in a country with lower taxation is then transferred elsewhere.

The net global profit of a multinational company can be expressed as follows (Horst, 1971):

$$\Pi = (1 - t_1)(R_1 + vM - C_1) + (1 - t_2)[R_2 - C_2 - vM] \quad (3)$$

In this simple example, we suppose a one-way trade from affiliate 1 to affiliate 2. Π stands for the net global profit of a multinational company, v is for the intrafirm price, M denotes the volume of intrafirm trade from country 1 to country 2, t_i is the tax rate in country i , R_i denotes the revenues of an affiliate in country i and C_i are costs of production in the respective countries ($i = 1, 2$).

If the relative difference in the tax rates $(t_2 - t_1) / (1 - t_2)$ is positive, the multinational company will maximize the intrafirm price v and its global profitability accordingly. In this way, the multinational company will lower its tax bill in country 2.

Even if profits of a multinational company are taxed on a consolidated basis⁶ in the country of FDI origin, there will exist the opportunity to avoid higher taxation. A multinational company will just retain (reinvest) all profits in its subsidiaries

⁶ In general, there are two alternative ways of multinational company taxation. One way is known as income taxation on the consolidated basis and the other is known as income taxation on the territory basis. The first alternative is characterized by taxation of all profits of a multinational company irrespective of the country of origin. Taxes which have been already paid abroad are deducted afterward. The second alternative is to tax profits which have been generated on the territory of a certain country.

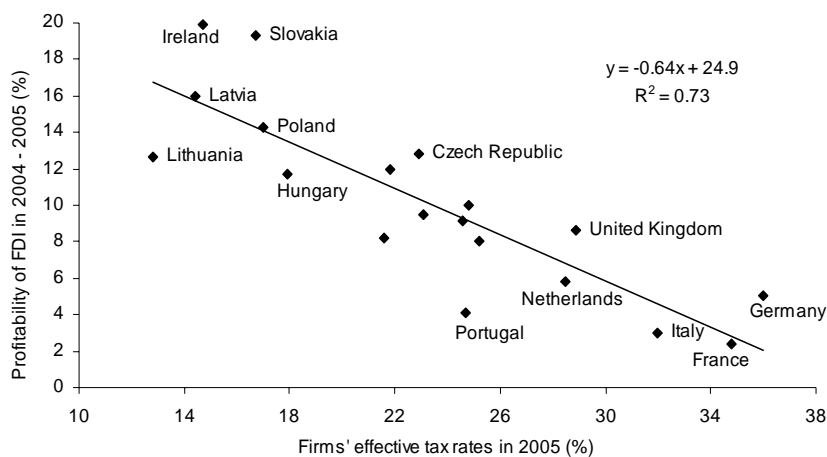
(local foreign-owned firms). That is why foreign activities of multinational companies are to a large extent financed by reinvested profits instead of loans. Consequently, the repatriated dividends taxation policy leads multinational companies to prefer foreign expansion in the form of equity capital before debt capital. Repatriation of profits from abroad is discouraged (Horst, 1977).

On the contrary, foreign-owned firms which operate in high tax countries are financed by intrafirm loans instead of equity capital.

Except for low taxation, several countries apply the policy of investment incentives which also include tax holidays. Multinational companies have thus even higher motives to manipulate their profits through intracompany prices. The supposed example is, among others, typical for the Czech Republic. The existence of tax holidays motivated foreign investors to set prices of Czech intrafirm production as high as possible and, subsequently, export the local production to affiliates in developed markets and, finally, transfer the gained profit from the Czech Republic as repatriated dividends.

Figure 1

Linear Relationship between Firms' Taxation and the Profitability of FDI



Note: The profitability of FDI in individual countries is the ratio of the debit size of the FDI income balance in time t on the stock of FDI in time $t - 1$. The sample of countries comprises Austria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Sweden and the United Kingdom.

Both estimated parameters in the equation are statistically significant.

Source: Eurostat and ZEW (2006); own calculations.

As indirect proof, we show in Figure 1 the relationship between the profitability of FDI in individual EU countries and the effective taxation in these countries. It is evident that the profitability in low tax countries like Ireland, Slovakia and Latvia is higher than the profitability in high tax countries like France, Italy or

Germany. Germany has been characterized by the highest effective taxation rate of 36%. The Czech Republic belongs to a group of countries situated in the middle of the sample (effective tax rate at 22.9% and FDI profitability at 12.8%).

Conclusion

We examine the effects of nominal exchange rate fluctuations on a small open economy where foreign-owned and domestic private firms co-exist. Such an economy is characterized by a high share of FDI stock on GDP which is typical for the Czech Republic. Applying the fixed effects panel data estimator, we utilize aggregate data on the Czech Republic's exporting manufacturing branches in the period from 1998 to 2006. We find out that nominal exchange rate changes have diverse effects on the two analyzed institutional sectors.

Specifically, exchange rate changes are directly reflected in the operational profitability of domestic private firms while foreign-owned firms limit the exchange rate impacts through transfer pricing which is carried out by multinational company-related trade. The exchange rate effects on domestic private firms are statistically significant even if we control for relative GDP growth and relative PPI inflation.

Based on our findings, we deduce that the main driving force of foreign owned firms' specific behavior is tax optimization. In particular, multinational companies artificially overvalue the value added and, consequently, gross profit of their affiliates (foreign-owned firms) located in low tax countries at the expense of affiliates located in high tax countries. The main reason is to minimize the global tax bill.

The hypothesis is demonstrated on a sample of EU countries where high tax countries like France, Italy and Germany are characterized by a lower FDI profitability in comparison with low tax countries like Ireland, Latvia or Slovakia. The described cross-border optimizing activities of multinational companies have recently become known as branding strategies and national statistical offices have started to adjust trade balances for them accordingly.

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