

# *The Exchange Rate Adjustment Role in Imperfect Competition: the Case of the Czech Republic*

## *Prizpůsobovací role měnového kurzu v prostředí nedokonalé konkurence: na příkladu České republiky*

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### Introduction

A flexible exchange rate is perceived by the traditional economic theory to be an inherent market mechanism of the economic adjustment in the case of an external imbalance. Depreciation of the exchange rate leads to elimination of a trade balance deficit and conversely appreciation of the exchange rate is associated with suppression of a trade balance surplus. The neoclassical theory assumption of perfect competition in international trade which means that exporting firms are not able to affect prices of their production is in the background of this mechanism.

Contrary to this assumption, we observe in reality the propagation of imperfect competition market structures in international trade which enables firms to set prices of their production above the level of marginal costs. For that reason the theory of intraindustry trade (Krugman, 1980, 1981, 1983) became an important enhancement of existing theories of international trade at the beginning of 1980's. The contribution of Obstfeld and Rogoff (1995) was another turning point which enriched traditional models of open economies with microeconomic assumptions of imperfect competition and nominal rigidities. They have been followed by many authors whose work is usually classified as new open economy macroeconomics.

Conclusions of new open economy macroeconomics tell mostly against the exchange rate adjustment mechanism of the goods and services balance because they are skeptical to the capability of the nominal exchange rate to effectively determine real exports and imports. Alternatively, exchange rate fluctuations are absorbed in profit margins of monopolistic firms [Betts & Devereux (2000), Corsetti & Pesenti (2005)]. Furthermore, growing importance of multinational companies in the world economy which is associated with the propagation of imperfect competition market structures contributes evidently to weakening of the exchange rate adjustment mechanism. Imperfect competition thus becomes the most frequent market structure in the globalized economy.

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\* *The Czech National Bank and the University of Economics in Prague. The opinions in this article are of the author and are not necessarily endorsed by the above mentioned institutions.*

The Czech Republic has been practising the flexible exchange rate of the Czech crown since 1997 and at the same time its economy is characterized by a great openness with significant activities of multinational companies. These are the main reasons why it represents the appropriate example for an analysis of prevailing role of a flexible exchange rate in the global economy. Additionally, the Czech Republic is in the process of preparations for the euro adoption. The analysis of benefits and costs of a flexible exchange rate could therefore enrich the discussion about timing of the Euro-Area entry.

In this article, I test the hypothesis whether fluctuations of the nominal exchange rate of the Czech crown are absorbed in profit margins of Czech exporting firms. This would imply weakening of the exchange rate adjustment mechanism of the goods and services balance. Simultaneously, I examine possible differences between firms which are possessed by residents (domestic private firms) and firms which are possessed by non-residents (firms under foreign control<sup>1</sup>). Differences in reactions of domestic private firms and firms under foreign control may reveal the effects of globalization on market adjustment mechanisms of a small open economy.

The article is divided into five chapters. After the initial definition of the problem, the attention is in the second chapter devoted to effects of imperfect competition on the exchange rate adjustment role. The third chapter provides the analysis of the Czech crown nominal exchange rate fluctuations impacts on the profitability of exporting firms which operate on the territory of the Czech Republic. Subsequently in connection with realized findings, the fourth chapter deals with a particular character of international trade which proceeds within a multinational company. The fifth chapter then summarizes the achieved results.

## **1 Imperfect competition in international trade**

Four possible mechanisms which deal with market balancing of trade balance disequilibrium can be found in the economic literature.<sup>2</sup> These possibilities comprise the price adjustment mechanism, the income adjustment mechanism, the exchange rate adjustment mechanism and the monetary approach to the balance of payments. These mechanisms mostly complement each other in reality. It is therefore very difficult to explore them in a pure theoretical form. In the case of an economy with a flexible exchange rate regime, it is obviously supposed that the exchange rate adjustment mechanism plays a key role.<sup>3</sup>

The exchange rate adjustment mechanism is based on the assumption that nominal exchange rate fluctuations change accordingly relative export and import prices and as a consequence there is the adjustment of demanded and supplied goods. Consequently, it leads to the equilibration of a possible external economic imbalance. Depreciation of the domestic currency leads to a decline of export prices which are denominated in the foreign currency and conversely to an increase of import prices which are denominated in

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1 A firm under foreign control is a firm where foreign investors control at least 50 % of its equity capital.

2 Dunn & Mutti (2000), Krugman & Obstfeld (1999), Gandolfo (1995), Baker (1995) and the others.

3 A flexible exchange rate which effectively equilibrates the external position of an economy enables domestic monetary policy to be fully concentrated only on conducting the internal price stability.

the domestic currency. Depending on the elasticity of demand and supply it increases the real amount of exports and at the same time it decreases the real amount of imports.<sup>4</sup>

The exchange rate adjustment mechanism is considered to be the important channel of the external economic imbalance remedy especially in the case of inelastic domestic prices and wages – ineffectiveness of the price adjustment mechanism. If domestic prices were as flexible as exchange rates, it would be irrelevant whether the adjustment come up through exchange rate changes or equivalent changes in internal prices (Friedman, 1953).

Nevertheless similarly to the price adjustment mechanism, the exchange rate adjustment mechanism has also certain limitations. According to Mundell (1960)<sup>5</sup> the effectiveness of the flexible exchange rate adjustment depends on the value of two parameters. Firstly, it depends on the sensitivity of capital flows on interest rates and secondly it depends on the sensitivity of trade balance on terms of trade. Considering the balance of goods and services, the second condition is particularly important.<sup>6</sup>

The assumption of prevailing imperfect competition in international trade represents the important restriction for the exchange rate adjustment mechanism of the goods and services balance. Krugman (1986) affirms the capability of firms to keep different prices of their production on different foreign markets (pricing-to-market) in relation to particularities of individual industrial branches.<sup>7</sup> Microeconomic assumptions of imperfect competition therefore gradually became the integral part of new models of open economies (Lane, 2001). Models became more complex but on the other side these models drew near the observed reality.<sup>8</sup>

The embedment of the imperfect competition assumption enabled the straight analysis of firms' pricing behavior as opposed to the neoclassical assumption of perfect competition in international trade where all firms are price takers. Monopolistic firms are able to set prices of their products above the level of marginal costs in these models. They attain a certain profit margin which enables them, at least partially, to absorb potential nominal exchange rate fluctuations without changing prices of their products on foreign markets.

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4 *The exchange rate adjustment mechanism is also denoted as the elasticity approach. The balance of goods and services is improved only if the sum of demand elasticity in foreign trade – the elasticity of domestic demand for imports and the elasticity of foreign demand for imports – is higher than one in absolute value (the Marshall-Lerner condition).*

5 *Mundell built up his approach on the basis of the Keynesian IS-LM model.*

6 *The empirically observed short-term insensitivity of trade balance on nominal exchange rate fluctuations is so called the J-curve effect which consists in short-term price inelasticity of supply and demand curves in international trade. The remediation of the balance of goods and services therefore come on mostly after a certain time lag due to this effect.*

7 *A monopolistic firm which has destination markets in different countries can price discriminate among individual countries by offering its production for lower prices in a low income country and on the contrary it can offer the same production for higher prices in a high income country.*

8 *One of the objectives of new approaches was to provide the decision making analytical system with a better alternative to the traditional Mundell-Fleming model.*

Let's imagine that an exporting firm attains simultaneously same profit margins on both a domestic and a foreign market in the period before a nominal exchange rate swing. The firm then absorbs a potential nominal exchange rate fluctuation in its profit margin without changing prices of exported production which is denominated in the foreign currency. Thus exchange rate fluctuations do not affect terms of trade between a domestic and a foreign country and either they do not affect the real amount of export production.

If for instance the domestic country currency appreciates, it will not imply a proportional growth in prices of exported production which is denominated in the foreign currency as it is supposed by the neoclassical theory. On the contrary, an exporting monopolistic firm will react by lowering prices of its export production which is denominated in the domestic currency in order to retain the same price which is denominated in the currency of a foreign market. In this way, a firm does not lose its current foreign market share. A monopolistic firm behaves accordingly in spite of it causes a decline in its profitability.<sup>9</sup>

As a result, the price of same production which is denominated in one currency will be different on a domestic market and on foreign markets due to the restricted international arbitrage and the effort of monopolistic firms to differentiate their production from a similar production of their competitors. We then observe systematic deviations of the law of one price in tradable goods contrary to the traditional economic theory which associates sources of nominal exchange rate deviations from the purchasing power parity only with the existence of a certain group of internationally non-tradable goods (Betts & Devereux, 2000).

Summarizing the above paragraphs, if firms price their production in the currency of a destination market (local-currency-pricing), the exchange rate adjustment role is disturbed because foreign prices are not affected by nominal exchange rate fluctuations. Local-currency-pricing is thus in the direct contrast to the strategy of producer-currency-pricing which is consistent with a flexible exchange rate regime [Obstfeld (2002), Corsetti & Pesenti (2005)].

Firms that operate in large economies such as the United States or the Euro-Area can be characterized by producer-currency-pricing. Firms in small economies like the Czech Republic are probably more characterized by local-currency-pricing. It can be assumed the asymmetric impact of the exchange rate in the case of small open economies which trade predominantly with one important trade partner. Exchange rate fluctuations are in this case entirely reflected in domestic import prices while foreign export prices are sticky.

According to Otani (2002), Japanese firms absorb approximately one-half of all exchange rate fluctuations in their profit margins while in the case of American firms the transmission of exchange rate fluctuations into foreign prices is complete. In other words, American firms prefer the strategy of producer-currency-pricing.

The exchange rate volatility, together with the relative size of a domestic and a foreign

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9 Profit margins will increase if the exchange rate depreciates and vice versa. Changes of the exchange rate do not cause expenditure switching but the income effect on the reported profitability of exporting firms.

economy, depends on the ratio of domestic and foreign firms which prefer the pricing-to-market strategy. The exchange rate between a small and a large economy becomes more volatile proportionally with the number of firms in a relatively smaller economy which apply the pricing-to-market strategy. If firms in a relatively smaller economy use the currency of a relatively larger economy as a unit of account, the volatility of the exchange rate between these two countries is high.<sup>10</sup>

The effects of exchange rate appreciation and depreciation can on average compensate each other. However, firms and even individuals prefer stability of their income before income fluctuations. The increased exchange rate volatility can thus force exporting firms to charge higher prices. These prices include a risk premium. Higher prices however cause a decrease in consumer surplus because less output is produced for higher prices (Obstfeld, 2001).

## 2 The impact of exchange rate fluctuations on Czech exporters

Similarly to Otani (2002) in the case of Asian economies I suppose asymmetric effects of the exchange rate even in the case of the Czech Republic. I proceed from the assumption that exporting firms in the Czech Republic apply the pricing-to-market strategy and nominal exchange rate fluctuations are therefore not reflected in foreign prices of their products. In this way, firms stabilize their real exports regardless of nominal exchange rate fluctuations because exchange rate fluctuations are absorbed in profit margins.

### 2.1 Tested hypothesis

The indicator of the operational profitability of sales is used to demonstrate immediate effects of exchange rate fluctuations on the profitability of exporting firms:

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

where  $\pi_t$  is the operational profitability of sales,  $\Pi_t$  is the operational profit in the nominal value,  $S_t$  are sales in the nominal value and  $t$  indicates time in quarters.

The operational profit in the absolute value can be expressed as:

$$\Pi_t = S_t - L_t - K_t - M_t, \quad (2)$$

where  $L_t$  is for labor costs,  $K_t$  represents the amortization of fixed assets and  $M_t$  indicates the production consumption. All quantities are in nominal values. The equation 1 can be therefore broken down in this way:

$$1 - \pi_t = \frac{L_t}{S_t} + \frac{K_t}{S_t} + \frac{M_t}{S_t}. \quad (3)$$

We get three relative indicators on the right side of the equation 3 which determine the

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<sup>10</sup> This assumption is empirically applicable on the exchange rates between the United States and Asian economies or between the Euro-Area and eastern European economies.

operational profitability of sales (profitability). They are the ratio of labor costs on sales ( $L/S$ ), the ratio of the capital consumption (amortization) on sales ( $K/S$ ) and the ratio of the production consumption on sales ( $M/S$ ).

The basic tested hypothesis is a linear dependence of year-on-year changes of the operational profitability of sales in exporting industries

$$\Delta\pi_t^{ex} = \pi_t^{ex} - \pi_{t-4}^{ex} \quad (4)$$

on year-on-year changes of the nominal effective exchange rate of the Czech crown  $\Delta z_t$ :

$$\Delta\pi_t^{ex} = \beta_0 + \beta_1 \Delta z_t + \varepsilon_t \quad (5)$$

The same equation (5) is then tested by replacing the indicator of the operational profitability  $\Delta\pi_t^{ex}$  with the partial indicators  $\Delta(L/S)_t^{ex}$ ,  $\Delta(K/S)_t^{ex}$  and  $\Delta(M/S)_t^{ex}$ . In this way, I examine the channels through which nominal exchange rate fluctuations affect the operational profitability.

## 2.2 Data

A freely available database of selected financial indicators of non-financial enterprises with more than one hundred employees which is published by the Czech Statistical Office was used.<sup>11</sup> These financial indicators are available partly according to particular industrial branches (OKEČ/CZ-NACE) and partly according to particular institutional sectors with the division into firms under foreign control, domestic private firms and public firms. The indicators are expressed in millions of Czech crowns and are published quarterly. They were available for the period beginning in 1998 until the end of 2006. This period is consistent with the flexible exchange rate regime of the Czech crown.

Only industrial branches with at least 60 % proportion of direct sales coming from exports were selected from all industrial branches of non-financial enterprises. They comprise manufacturing of textiles, textile products and clothing industry (DB), manufacturing of leather and leather products (DC), manufacturing of wood and wood products out of furniture (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 share of value added of exporting industrial branches on total value added of the manufacturing industry was 55 % in 2006.

## 2.3 Estimation results

Considering all exporting industrial branches regardless of the property structure of particular firms, there was not detected any significant dependence between exchange

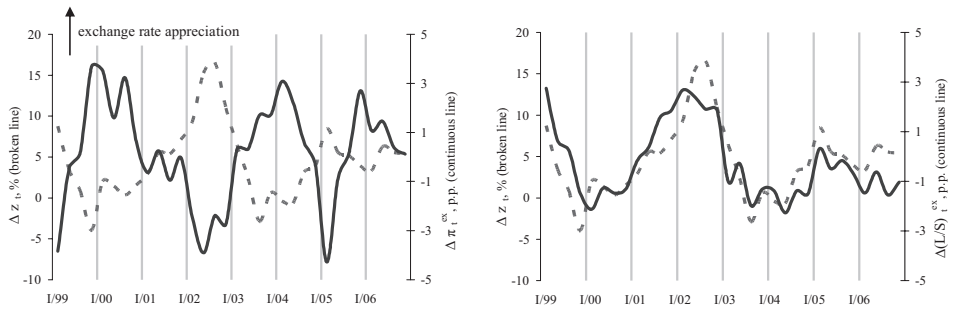
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<sup>11</sup> CSO: *Economic Results of Non-financial Enterprises*.

rate fluctuations and the indicator of the operational profitability. Similarly, there was not detected any significant dependence in the case of public firms. It could be however related to a non-exporting character of public firms' production. A statistically significant dependence was detected in the case of domestic private firms and firms under foreign control.

In the case of exporting domestic private firms, the exchange rate fluctuations are immediately reflected in the reported profitability. It is in accordance with the assumptions included in chapter two.

**Figure 2.1:** Development of profitability indicators of private domestic firms in the dependence on the nominal effective exchange rate of the Czech crown



**Table 2.1:** Estimated parameters of linear regression (domestic private firms)

	$\beta_0$	$\beta_1$	Number of observations	Adjusted R <sup>2</sup>
$\Delta\pi^{ex}$	1.88*** (0.32)	-0.38*** (0.05)	32	0.64
$\Delta(L/S)^{ex}$	-1.39*** (0.24)	0.25*** (0.04)	32	0.58

*Note: Standard errors are given in parentheses. The stars denote significance as follows: \*\*\* 1%, \*\* 5% and \* 10%. The granger causality test confirms the dependence of the operational profitability and of the partial indicator of labor costs on sales on nominal effective exchange rate fluctuations of the Czech crown.*

Nominal effective exchange rate fluctuations of the Czech crown are in the case of exporting domestic private firms reflected in the operational profitability ( $\pi^{ex}$ ). One percent year-on-year nominal exchange rate appreciation implies the year-on-year decrease in the operational profitability of sales of about 0.38 percentage points. Domestic private firms thus absorb a relatively high portion of nominal exchange rate fluctuations in their profit margins.

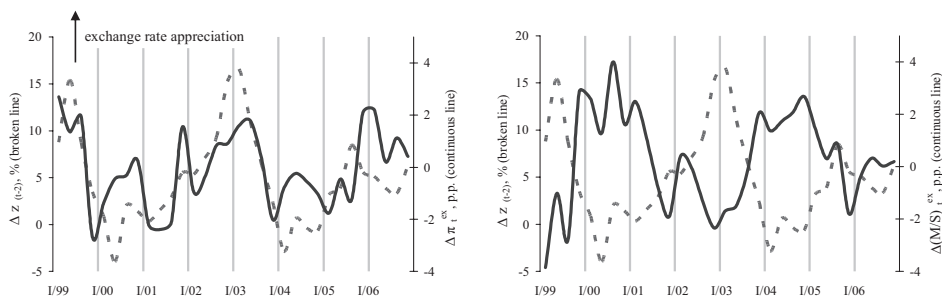
This hypothesis is also supported by a positive (statistically significant) dependence of the partial indicator of labor costs on sales  $(L/S)^{ex}$ .<sup>12</sup> Because I suppose nominal stickiness of labor costs I ascribe all fluctuations of the mentioned indicator to changes in sales. In the short-term, I also do not suppose changes in the real amount of export production. Consequently, changes in sales are attributed to changes in prices which are denominated in the Czech currency. Production prices which are denominated in the foreign currency are stable at the same time. It is a classical example of the local-currency-pricing strategy which is described in chapter two.

It seems that a great part of the production consumption is imported (imported inputs) and its price is determined by the exchange rate while the final production (exported output) is priced in the foreign currency and therefore it is not affected by nominal exchange rate fluctuations.

The statistically significant coefficient  $\beta_0$  is probably related to trend nominal exchange rate appreciation of the Czech currency which is associated with the real convergence of the Czech economy. According to Podpiera & Raková (2006), trend appreciation of the domestic currency increases the degree of competition which is perceived by exporting firms because it causes diminishing profit margins from export markets.

In the case of firms under foreign control, there is no evidence of immediate impacts of the Czech crown nominal effective exchange rate fluctuations on the examined indicator of the operational profitability. A statistically significant dependence is visible only with the exchange rate lagged for two quarters. But contrary to domestic private firms, exchange rate fluctuations affect the operational profitability of firms under foreign control in the opposite direction. The exchange rate appreciation which is lagged for two quarters is associated with the profitability growth of exporting firms under foreign control. Even if with the distinctively lesser intensity compared to domestic private firms (see estimated parameters in the table 2.1 and 2.2).

**Figure 2.2:** Development of the profitability indicators of firms under foreign control in the dependence on the nominal effective exchange rate of the Czech crown (the exchange rate is lagged for two quarters)



12 The other partial indicators were not statistically significant.



The exchange rate fluctuations are mostly reflected in the partial indicator of the production consumption on sales in the case of firms under foreign control. It indicates that firms under foreign control are able to manage prices of inputs (intermediate products) and outputs (final products) on international markets much better than domestic private firms. Due to this fact, we do not observe significant fluctuations of the operational profitability in relation to exchange rate fluctuations and neither have we observed more significant effects of exchange rate fluctuations on the partial indicator of labor costs on sales.

**Table 2.2:** Estimated parameters of linear regression (firms under foreign control)

$\Delta z_{t-2}$	$\beta_0$	$\beta_1$	Number of observations	Adjusted R <sup>2</sup>
$\Delta\pi^{\text{ex}}$	-0.89*** (0.31)	0.17*** (0.05)	32	0.30
$\Delta(M/S)^{\text{ex}}$	1.61*** (0.33)	-0.27*** (0.05)	32	0.49
$\Delta(L/S)^{\text{ex}}$	-0.38** (0.15)	0.06** (0.02)	32	0.17

*Note: Standard errors are given in parentheses. The stars denote significance as follows: \*\*\* 1%, \*\* 5% and \* 10%. Based on the granger causality test we can reject the hypothesis that the Czech crown nominal effective exchange rate fluctuations which are lagged for two quarters do not affect the operational profitability of sales. The same holds for the indicator of the production consumption on sales.*

It seems that firms under foreign control are able to keep prices of their final export products stable in the Czech currency whereas the crown price of imported inputs (VS) is determined by the exchange rate (asymmetric behavior of the exchange rate).

**Table 2.3:** Mean values of the quarterly indicators in the observed period (1.Q 1998 – 4.Q 2006)

	Mean		Standard Deviation	
	SD	PZK	SD	PZK
Operational Profitability of Sales	5.0	5.8	2.7	1.8
Labor Costs on Sales	20.2	9.1	1.5	0.6
Capital Costs on Sales	4.8	4.9	0.8	0.6
Production Consumption on Sales	70.0	80.3	2.2	2.0

*Note: SD - domestic private firms, PZK - firms under foreign control. The volatility of the indicators is lower in the case of firms under foreign control.*

Subsidiary firms of multinational companies have probably guaranteed their foreign sales and they can afford to reflect changes of the exchange rate in their foreign prices. Hence, they can easily adopt the strategy of producer-currency-pricing (see chapter two). Guaranteed foreign markets in the case of multinational companies imply weakening of the exchange rate adjustment mechanism. The reason is a non-elastic foreign demand for products of a subsidiary firm.

It seems that the management of a multinational company controls prices of inputs and outputs that are exchanged within a multinational company in order to optimize the global (total) profitability independent of the profitability of particular subsidiary firms which operate in different host countries. Contrary to a subsidiary firm of a multinational company, a domestic private firm is forced to absorb exchange rate fluctuations in its profit margins to sustain its current foreign market share.

### **3 The intrafirm trade of multinational companies**

Firms under foreign control have a unique position due to their property interconnection abroad. One of the possible channels through which the management of a multinational company can affect financial results of particular subsidiary firms is exactly the intrafirm trade within a multinational company.

Hipple (1990) defines several levels of the intrafirm trade. The widest definition of the intrafirm trade of a multinational company comprises business transactions when every home firm of a multinational company or subsidiary firms of a multinational company perform as importers or exporters. On the other hand the narrowest (clear) intrafirm trade is considered to comprise business transactions only between a home firm and its subsidiary firms. It is obvious from the definition of the intrafirm trade that it is affected by different factors compared to factors which affect foreign trade between mutually independent business partners.<sup>13</sup>

If an economy is characterized by a high share of the economic activity which is generated by foreign direct investment, the analysis of its foreign trade becomes more complex and some business relations should be interpreted with additional explaining factors (Benignati, 1990).

Neighbour (2002) and Ernst&Young (2005-2006) confirm a high proportion of the intrafirm trade on the total world trade. Clausing (2003) estimates the share of the intrafirm trade on the total foreign trade of the United States to about 40 %. Due to growing importance of the intrafirm trade, the OECD introduced guidelines which regulate international transfers of goods and services within a multinational company.<sup>14</sup>

The simplest solution for the management of a multinational company is to use market prices when intrafirm transactions are priced. Nevertheless, this solution is effective only if market

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<sup>13</sup> Rugman (1996) interprets the rise and functioning of multinational companies by the endeavor of firms to replace external markets by intrafirm transactions.

<sup>14</sup> OECD (2001) *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrators*.

prices are determined on perfectly competitive markets. In the case that firms operate on imperfectly competitive markets or if a relevant market for a given transferred product do not exist then the optimal intrafirm price should be set at the level of marginal costs of a subsidiary firm. Such an intrafirm price corresponds to a decentralized or arm's length<sup>15</sup> price (Hirshleifer, 1956).

Nevertheless, intrafirm prices are often different from arm's length prices in reality. Tax optimization and minimization of customs duties represent fundamental motives for multinational companies to centrally manage prices of intrafirm transactions [Horst (1971), Copithorne (1971)].

If tariff barriers or international differences in profit taxation exist, the management of a multinational company sets the intrafirm price in order to maximize the global net profit adjusted for effects of customs duties and differences in tax rates irrespective of the profitability rate of particular subsidiary firms which are located in different countries.

There are generally three basic possibilities of the internal prices determination. The first possibility is the already mentioned basic example with no customs duties and same effective taxation home and abroad. In this case, the optimal solution is to set the internal price of an exchanged product at the level of marginal costs<sup>16</sup> of an exporting subsidiary firm (decentralized arm's length transaction).

The second possibility is the case when a relative difference in tax rates of the two countries under consideration is zero or at least it is lower than customs duties. A multinational company chooses the lowest possible intrafirm price under these conditions and subsequently it repatriates high dividends. Even if a subsidiary firm of a multinational company is in a loss, it will be maintained in the operation because of minimization of customs duties. A multinational company will be importing at the intrafirm price which is under the level of a market price.<sup>17</sup>

In the case of no customs duties or in the case when customs duties are lower than a relative difference in tax rates between the two countries, a multinational company will choose the strategy of the internal price maximization. Higher internal prices raise paid customs in the case of positive customs duties but, on the other hand, a multinational company avoids high taxes.<sup>18</sup>

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15 *Arm's length transaction is a transaction 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. Or sometimes, a transaction between two otherwise unrelated or affiliated parties.*

16 *Or setting the internal price at the level of market prices in the case of perfect competition.*

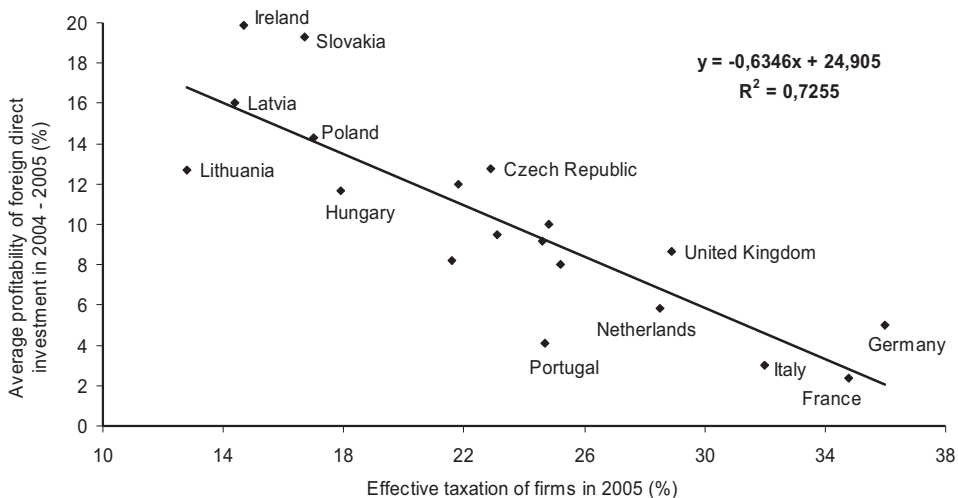
17 *Multinational companies will choose the strategy of transfer price minimization when tax rates converge across particular countries in order to minimize customs duties.*

18 *This is a likely situation for the Czech Republic where foreign investors were motivated through the implementation of tax holidays to set maximum prices of products which are assembled in the Czech Republic and exported in developed countries. Profits gained in the Czech Republic are then transferred abroad as dividends or are reinvested.*

The economic policy of high tariffs paradoxically enables price discrimination across countries and it causes ineffectiveness of the national tax policy. Countries which are characterized by high import tariffs can raise taxation of firms above the level of taxation in other countries without causing a replacement of local production by intrafirm imports.

Even if profits of a multinational company are taxed on the consolidated basis<sup>19</sup> in a home country of a foreign investor, there exists a possibility how to avoid higher taxes in a home country. A multinational company can simply retain (reinvest) all profits in its subsidiary firm. That's why foreign activities of multinationals are in a large extent financed by reinvested profits. The policy of repatriated dividends taxation leads multinationals to prefer financing of subsidiary firms by the equity capital before the debt capital. It discourages multinational companies from the repatriation of foreign profits (Horst, 1977).<sup>20</sup>

**Figure 3.3:** Dependence of the average profitability of foreign direct investment on taxation in EU countries



Source: Eurostat and ZEW (author's calculations)

Note: The profitability of foreign direct investment in selected countries is calculated as a ratio of the debit size of the foreign direct investment income balance in time  $t$  on the stock of foreign direct investment in time  $t-1$ . Selected countries comprise 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.

<sup>19</sup> There are in general two alternative ways of multinational company taxation. The one is known as income taxation on the consolidated basis and the other one is known as income taxation on the territory basis. The first alternative is characterized by taxation of all profits of a multinational company irrelevant the country of their origin and afterwards taxes which have been already paid abroad are deducted. The second alternative is to tax profits which have been generated on the territory of a certain country.

<sup>20</sup> Subsidiary firms which operate in high tax countries are financed by the intrafirm loan instead of the equity capital.

The linear regression indicates a significant dependence between the profitability of foreign direct investment (firms under foreign control) and the effective rate of profit taxation. Both estimated parameters in the equation are statistically significant.<sup>21</sup>

Low tax countries are in the upper left corner of the figure 3.3. These countries have a relatively high profitability of foreign direct investment. They comprise Ireland, Slovakia and Latvia. On the other hand, high tax countries are in the lower right corner of the figure 3.3. These countries are characterized by a relatively lower profitability of foreign direct investment. They comprise particularly France, Italy and Germany which has the highest effective taxation (36 %). Firms in the Czech Republic are taxed by the effective tax rate of 22.9 % and they reach the average profitability of 12.8 %.

Except low taxation, some countries apply the economic policy of investment incentives which also include tax holidays for several years. Multinational companies have thus sufficient motives to artificially increase value added and gross profits through internal prices in these countries.<sup>22</sup>

The difference between internal prices and common arm's length prices leads to distortions on the macroeconomic level in the case of small open economies which are characterized by a significant role of multinational companies. Barry (2005) demonstrates the effects of price strategies of multinationals in the case of the Irish economy. He argues that gross value added per employee is higher in Ireland compared with other EU countries whereas the ratio of labor costs on production attains a substantially lower level in Ireland. He therefore warns against an excessive reliance on the indicators of value added in countries which are characterized by a significant role of multinational companies.

Based on the empirical analysis of the foreign trade of the United States, Clausing (2003) concludes that in the case of low tax countries export prices of the American intrafirm trade are lower and import prices of the American intrafirm trade are higher compared to arm's length prices. Similarly Bartelsman & Beetsma (2003) argue that the tax motivated manipulation of intrafirm prices affects the reported firm productivity because sales in low tax countries can be overvalued and the production consumption undervalued. The manipulation of intrafirm prices can cause growth in the measured productivity in countries which lower taxation even without a technological change.

The Czech Republic is a typical country where value added can be overvalued by firms under foreign control due to a relatively lower effective taxation and investment incentives in the Czech Republic.<sup>23</sup> The share of firms under foreign control on total value added

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21 *If the effective taxation were zero, then the annual profitability of foreign direct investment would reach nearly 25 %.*

22 *Multinational companies concentrate their production into countries which have the lowest production costs and final products are then sold on foreign markets where a multinational company reaches the highest price.*

23 *The manipulation with prices of the internal trade may be the reason of a markedly faster growth in value added of the manufacturing industry which is export oriented in comparison with the remainder of the economy.*

of the manufacturing industry is more than 50 % in the Czech Republic. The industrial branch with the highest contribution of multinational companies to value added is manufacturing of transport vehicles and equipment (84 %).<sup>24</sup>

Moreover, the production of firms under foreign control is mainly export oriented. With the knowledge of additional data<sup>25</sup> I estimate the export share of firms under foreign control to about one-half of total exports of the Czech Republic while the share of sales from direct exports of goods and services of firms under foreign control on total sales from direct exports of industrial firms reached approximately 70.2 % in 2004.

International trade between mutually independent business partners was gradually decreasing during the period from 1999 when it was approximately 65 % until 2004 when it was approximately 50 %. When interpreting the Czech foreign trade, it is therefore necessary to apply the above mentioned findings of optimization strategies of multinational companies besides the traditional economic theory of international trade.

## Conclusion

On the basis of the assumption of prevailing imperfect competition in international trade which is, apart from other things, intensified by an increasing role of multinational companies, the effects of nominal effective exchange rate fluctuations of the Czech crown on the profitability indicators of exporting industrial branches in the Czech Republic were analyzed. It seems that non-financial firms which are possessed by Czech residents apply the strategy of local-currency-pricing. Therefore, the exchange rate fluctuations are absorbed in profit margins. Consequently, nominal exchange rate fluctuations do not cause adequate changes in relative foreign prices. No adjustment of real amount of exports and imports then occurs.

Contrary to domestic private firms, firms under foreign control respond to nominal exchange rate fluctuations differently. The behavior of firms under foreign control indicates the application of specific pricing strategies which are applied within subsidiary firms of a multinational company. One of the incentives for a multinational company is the tax optimization which leads to a purpose-built influencing of financial results of subsidiary firms. A multinational company maximizes its total (consolidated) net profit regardless of the profitability rate of particular subsidiary firms. The way which the intrafirm transactions are priced is thus in a large extent dependent on centralized decision making of the management of a multinational company. Through the manipulation of intrafirm prices, multinationals transfer profits from countries with higher taxation to countries with lower taxation of incomes. There really exists the dependence between the level of effective taxation of firms and the reported profitability of firms under foreign control on a sample of EU countries.

Both local-currency-pricing in the case of domestic private firms and optimization strategies of multinational companies imply weakening of the exchange rate adjustment

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<sup>24</sup> CSO: *Industry in the Czech Republic: Economic Results in 2000-2004*.

<sup>25</sup> *The Czech National Bank publishes the Annual Report on Foreign Direct Investment which includes among other things selected indicators of firms under foreign control. The Czech Statistical Office publishes the statistics of industry and construction.*

mechanism of the goods and services balance. In the case of small open economies, arguments in favor of a flexible exchange rate regime are therefore weakening with increasing globalization and imperfect competition in international trade.

## Abstract

One of the approaches to an international trade analysis is the assumption of prevailing imperfect competition where monopolistic firms determine prices of their production on segmented foreign markets. Based on aggregate data of quarterly financial indicators of non-financial enterprises, the hypothesis was tested whether producers based in the Czech Republic absorb nominal exchange rate fluctuations in their profit margins. Estimated results indicate that domestic private firms absorb a substantial part of exchange rate fluctuations whereas the impact on firms under foreign control is ambiguous which implies application of optimization strategies in the case of multinational companies. These strategies are associated with pricing of intrafirm transactions. Tax optimization of multinational companies causes the dependence of the profitability of firms under foreign control on the level of effective taxation in EU countries. Both local-currency-pricing strategy (domestic private firms) and optimization strategies of multinational companies (firms under foreign control) lead to weakening of the exchange rate adjustment mechanism. In the case of small open economies, arguments in favor of a flexible exchange rate regime are therefore weakening with increasing globalization and imperfect competition in international trade.

## Keywords

exchange rate, foreign market, imperfect competition, multinational company, pricing-to-market, profit margin

## JEL classification / JEL klasifikace

F12, F23, F41, L11

## Souhrn

Jedním z přístupů k analýze mezinárodního obchodu je předpoklad o převažující nedokonalé konkurenci, kde monopolistické firmy ovlivňují cenu své produkce na segmentovaných zahraničních trzích. Na základě agregovaných dat čtvrtletních finančních ukazatelů nefinančních podniků byla testována hypotéza, zda výrobci v ČR absorbují pohyby nominálního měnového kurzu ve svých ziskových maržích. K absorpci kurzových pohybů dochází zejména v případě domácích soukromých firem, zatímco v případě firem pod zahraniční kontrolou je tento dopad nejednoznačný, což ukazuje na uplatňování optimalizačních strategií nadnárodních společností při oceňování vnitrofiremních transakcí. Díky daňové optimalizaci nadnárodních společností existuje závislost mezi vykazovanou ziskovostí firem pod zahraniční kontrolou a výší efektivního zdanění firem v zemích EU. Jak strategie oceňování produkce v měně cílového trhu (domácí soukromé firmy), tak optimalizační strategie nadnárodních společností (firmy pod zahraniční kontrolou) vedou k oslabování kurzového vyrovnávacího mechanismu. S rostoucí globalizací a nedokonalou konkurencí v mezinárodním obchodě proto oslabují argumenty ve prospěch režimu flexibilních měnových kurzů v malých otevřených ekonomikách.

## Klíčová slova

měnový kurz, nadnárodní společnost, nedokonalá konkurence, „pricing-to-market“, zahraniční trh, zisková marže

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## References

- BACCHETTA, P., WINCOOP, E. (2000).** Does Exchange-Rate Stability Increase Trade and Welfare? *The American Economic Review*. vol. 90, no. 5, pp. 1093-1109.
- BAILLIU, J., BOUAKEZ, H. (2004).** Exchange Rate Pass-Through in Industrialized Countries. *Bank of Canada Review* [on line]. Spring 2004 [cit. 2007-06-07]. <<http://www.bankofcanada.ca/en/review/spring04/baillieue.pdf>>
- BAKER, S.A. (1995).** *International Economics*. 2nd edition. Cambridge (MA): Blackwell, ISBN 1-878975-49-8.
- BARRY, F. (2005).** FDI, transfer pricing and the measurement of R&D intensity. *Research Policy*. vol. 34, is. 5, pp. 673-681.
- BARTELSMAN, E.J., BEETSMA, R.M. (2003).** Why pay more? Corporate tax avoidance through transfer pricing in OECD countries. *Journal of Public Economics*. vol. 87, is. 9-10, pp. 2225-2252.
- BENVIGNATI, A. M. (1990).** Industry Determinants and "Differences" in U.S. Intrafirm and Arms-Length Exports. *The Review of Economics and Statistics*. vol. 72, no. 3, pp. 481-488.
- BETTS, C., DEVEREUX, M.B. (2000).** Exchange rate dynamics in a model of pricing-to-market. *Journal of International Economics*. vol. 50, is. 1, pp. 215-244.
- CLAUSING, K.A. (2003).** Tax-motivated transfer pricing and US intrafirm trade prices. *Journal of Public Economics*. vol. 87, is. 9-10, pp. 2207-2223.
- COPITHORNE, L.W. (1971).** International Corporate Transfer Prices and Government Policy. *The Canadian Journal of Economics*. vol. 4, no. 3, pp. 324-341.
- CORSETTI, G., PESENTI, P. (2005).** International dimensions of optimal monetary policy. *Journal of Monetary Economics*. vol. 52, is. 2, pp. 281-305.
- CNB: Přímé zahraniční investice (Foreign Direct Investment)** [online]. Prague: Czech National Bank, 2000-2006 [cit. 2007-03-15]. <[http://www.cnb.cz/www.cnb.cz/cz/statistika/platebni\\_balance\\_stat/publikace\\_pb/pzi/index.html](http://www.cnb.cz/www.cnb.cz/cz/statistika/platebni_balance_stat/publikace_pb/pzi/index.html)>
- CSO: Ekonomické výsledky nefinančních podniků (Economic Results of Non-financial Enterprises)** [online]. Prague: Czech Statistical Office, 2007 [cit. 2007-06-14]. <[http://www.czso.cz/csu/2007edicniplan.nsf/publ/5101-07-za\\_rok\\_2006\\_a\\_jednotliva\\_ctvrtleti](http://www.czso.cz/csu/2007edicniplan.nsf/publ/5101-07-za_rok_2006_a_jednotliva_ctvrtleti)>



- CSO:** Ekonomické výsledky průmyslu ČR v letech 2000-2004 (Industry in the Czech Republic: Economic Results in 2000-2004) [online]. Prague: Czech Statistical Office [cit. 2007-03-15]. <[http://www.czso.cz/csu/2006edicniplan.nsf/publ/8006-06-2000\\_2004](http://www.czso.cz/csu/2006edicniplan.nsf/publ/8006-06-2000_2004)>
- DORNBUSCH, R. (1987).** Exchange Rates and Prices. *The American Economic Review*. vol. 77, no. 1, pp. 93-106.
- DUNN, R.M., MUTTI, J.H. (2000).** *International Economics*. 5th edition. London: Routledge, ISBN 0-415-20879-3.
- ENGEL, CH. (2000).** Local-currency pricing and the choice of exchange-rate regime. *European Economic Review*. vol. 44, is. 8, pp. 1449-1472.
- ERNST&YOUNG:** *Global Transfer Pricing Trends, Practices, and Analysis: 2005-2006 Global Transfer Pricing Surveys* [online]. 2005 [cit. 2007-03-15]. <[http://www.ey.com/global/content.nsf/International/Transfer\\_Pricing\\_Global\\_Survey\\_2005-2006](http://www.ey.com/global/content.nsf/International/Transfer_Pricing_Global_Survey_2005-2006)>
- FRIEDMAN, M. (1953).** *Essays in Positive Economics*. University of Chicago Press, ISBN 978-0-226-26403-5.
- GANDOLFO, G. (1995).** *International Economics II: International Monetary Theory and Open-Economy Macroeconomics*. 2nd edition. Berlin: Springer, ISBN 3-540-58687-3.
- HIPPLE, F.S. (1990).** The Measurement of International Trade Related to Multinational Companies. *The American Economic Review*. vol. 80, no. 5, pp. 1263-1270.
- HIRSHLEIFER, J. (1956).** On the Economics of Transfer Pricing. *The Journal of Business*. vol. 29, no. 3, pp. 172-184.
- HORST, T. (1977).** American Taxation of Multinational Firms. *The American Economic Review*. vol. 67, no. 3, pp. 376-389.
- HORST, T. (1971).** The Theory of the Multinational Firm: Optimal Behavior under Different Tariff and Tax Rates. *The Journal of Political Economy*. vol. 79, no. 5, pp. 1059-1072.
- KRUGMAN, P., OBSTFELD, M. (1999).** *International Economics: Theory and Policy*. 4th edition. Reading (MA): Addison Wesley Longman, ISBN 0-321-05593-4.
- KRUGMAN, P. (1986).** Pricing to market when the exchange rate changes. Cambridge (USA): National Bureau of Economic Research Working Papers Series. no. 1926.
- KRUGMAN, P. (1983).** New Theories of Trade Among Industrial Countries. *The American Economic Review*. vol. 73, no. 2, pp. 343-347.
- KRUGMAN, P. (1981).** Intraindustry Specialization and the Gains from Trade. *The Journal of Political Economy*. vol. 89, no. 5, pp. 959-973.
- KRUGMAN, P. (1980).** Scale Economies, Product Differentiation, and the Pattern of Trade. *The American Economic Review*. vol. 70, no. 5, pp. 950-959.
- LANE, P. R. (2001).** The new open economy macroeconomics: a survey. *Journal of International Economics*. vol. 54, is. 2, pp. 235-266.
- MUNDELL, R. A. (1960).** The Monetary Dynamics of International Adjustment under Fixed and Flexible Exchange Rates. *The Quarterly Journal of Economics*. vol. 74, no. 2, pp. 227-257.
- NEIGHBOUR, J. (2002).** Transfer pricing: Keeping it at arm's length. *OECD Observer* [online]. no. 230 [cit. 2007-03-15]. <[http://www.oecdobserver.org/news/fullstory.php/aid/670/Transfer\\_pricing:\\_Keeping\\_it\\_at\\_arms\\_length.html](http://www.oecdobserver.org/news/fullstory.php/aid/670/Transfer_pricing:_Keeping_it_at_arms_length.html)>.
- OBSTFELD, M. (2002).** Exchange Rates and Adjustment: Perspectives from the New Open-Economy Macroeconomics. Keynote Speech [on line]. Bank of Japan: Institute for Monetary and Economic Studies. vol. 20, no. S-1 (special edition) [cit. 2007-06-06]. <<http://www.imes.boj.or.jp/english/publication/mes/2002/me20-s1-4.pdf>>

- OBSTFELD, M. (2001).** International Macroeconomics: Beyond the Mundell-Fleming Model [on line]. International Monetary Fund Staff Papers. vol. 47 (Special Issue), [cit. 2007-06-06]. <<http://www.internationalmonetaryfund.com/external/pubs/ft/staffp/2000/00-00/o.pdf>>
- OBSTFELD, M., ROGOFF, K. (1995).** Exchange Rate Dynamics Redux. Journal of Political Economy. vol. 103, no. 3, pp. 624-660.
- OECD:** Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrators. Paris: Organization for Economic Co-operation and Development, 2001. ISBN 9789264186286.
- OTANI, A. (2002).** Pricing-to-Market (PTM) and the International Monetary Policy Transmission: The „New Open-Economy Macroeconomics“ Approach [on line]. Bank of Japan: Institute for Monetary and Economic Studies. vol. 20, no. S-1 (special edition) [cit. 2007-06-06]. <<http://www.imes.boj.or.jp/english/publication/mes/2002/me20-3-1.pdf>>
- PODPIERA, J., RAKOVÁ, M. (2006).** Degree of Competition and Export-Production Relative Prices when the Exchange Rate Changes: Evidence from a Panel of Czech Exporting Companies [on line]. Czech National Bank Working Papers Series. no. 10 [cit. 2007-06-06]. <[http://www.cnb.cz/www.cnb.cz/en/research/research\\_publications/cnb\\_wp/download/cnbwp\\_2006\\_10.pdf](http://www.cnb.cz/www.cnb.cz/en/research/research_publications/cnb_wp/download/cnbwp_2006_10.pdf)>
- RUGMAN, A.M. (1996).** *The theory of multinational enterprises: The selected scientific papers of Alan M. Rugman*. Cheltenham (UK): Edward Elgar Publishing, ISBN 1-85898-409-2.
- RUGMAN, A.M., EDEN, L. (1985).** *Multinationals and Transfer Pricing*. Houndmills (UK): Palgrave Macmillan, ISBN 0312552572.
- ZEW:** EU Comparison Reveals Peak Load for Germany [online]. Mannheim: Centre for European Economic Research, 18.4.2006 [cit. 2007-06-07]. <[http://www.zew.de/en/presse/presse.php?action=article\\_show&LFDNR=584](http://www.zew.de/en/presse/presse.php?action=article_show&LFDNR=584)>