

EXCHANGE RATE AND THE SUPPLY RESPONSE: IS THE PPP A RELEVANT RULE FOR ASSESSING THE EQUILIBRIUM?

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ABSTRACT

Exchange rates in transition economies became a topic of numerous debates with controversial economic policy recommendations. The paper investigates the role of real exchange rate based on relative prices and its impact on the real supply. Three empirical tests of the Czech trade with its 31 main trading countries have shown that both the absolute and the relative purchasing power parity doctrines were in conflict with the evolution of trade during 1993-96. The real exchange rate then becomes a concept, which gives elusive conclusions for the economic policy. The results suggest that the bias in statistics of inflation and the changes in quality, goodwill, market structure and terms of trade should be considered in the assessment of the equilibrium exchange rate.

Keywords: real exchange rate, purchasing power parity, foreign trade, product quality, inflation.

1. Introduction

The functioning of the Eastern European economies received much attention after their changeover to markets after 1989. The peculiarities in the subsequent development in these countries posed several new empirical issues to be theoretically explained. The problem of equilibrium real exchange rate (RER) and exchange rate stability in these economies has remained one of the most resilient features to solve. Contrary to traditional experience in dealing with exchange rate adjustment, many of these countries, after sharp devaluations of their currencies to the level of market equilibrium, went through a long period of real appreciation. Both the economic policy-makers and the theorists were then not able to get on an equivocal agreement in the interpretation of these developments. It became apparent that many rules that functioned satisfactorily in stable economies, became of ill advice for economies in transition or for economies undergoing a fast industrial restructuring. The Czech case is a prime example of how the exchange rate could behave in the most unexpected way. Table 1 shows the basic indicators relevant for the assessment of RER and the evolution of the environment influencing the RER.

Czech economy transforms over 55% of its GDP through exports. For such an economy the exchange rate becomes a macroeconomic variable of fundamental importance. The point of departure from the central planning to free markets in 1990 was marked by a devaluation of 114%. Though the ensuing pass-through to inflation was sharp, it took full four years until the RER returned to the pre-devaluation level. In 1994 the inflation levelled the actual RER with its value in 1989. In point *P* the gap between average domestic prices and the prices in the EU was of the same magnitude as it was before transformation. By many it was thought untenable and a nominal depreciation was expected. However, in the following four years (1995-98) the nominal exchange rate both to German Mark and US Dollar

remained unperturbed and practically equal to their rates in December 1990, while the aggregated CPI inflation rate scored additional 39% during 1995-98. The influence of both adverse determining factors (the inflation and the RER appreciation) notwithstanding, the Czech trade performance during the whole period of 1990-98 showed an unparalleled growth.

The problems of the credibility of privatization, the burden of heavily indebted banks resulted in a pressure for depreciation that culminated in 1997 when Koruna was let free, what resulted in a depreciation of approximately 13%. The developments in 1998 showed that this depreciation was just a minor episode alleviating temporarily the process of restructuring and that the actual RER has been converging up to its previous path. However, the wave of economic restructuring and slow growth caused another forex shock in February 1999. After that, the economy recovered and the real exchange rate converged again to its equilibrium level.

Figure 1 illustrates the basic developments at issue. The problems to clarify are as follows:

- a) What is the optimal level of devaluation at the beginning of transition?
- b) Is the prolonged RER appreciation a sustainable development compatible with growth or is this tendency detrimental to the performance of domestic industries?
- c) Is the path of fundamental RER equilibrium above or below the empirical trajectory of RER?
- d) Is the RER development converging quickly to the equilibrium RER or will that tendency be prolonged to a long run?
- e) Is the measure of RER based on CPI or PPI a meaningful concept for the economic policy in countries with highly dynamic real (i.e. non-monetary) changes?

The aim of this paper is to test empirically the past behaviour of Czech producers, exporters and importers, and their foreign trade response to exchange rates adjusted to purchasing power parity (PPP) differentials in various countries. The results of the test are important for drawing implications about the validity of the PPP rule in a country in transition. In case that the tests would reject the validity of the PPP hypothesis, then relative price levels are not a primary factor relevant for the real behaviour of economic agents in the international trade and the trade competitiveness must be described by other variables than relative prices. An alternative interpretation of the real exchange rate is attempted at the end of the paper.

The relevance of real exchange rate appreciation is outlined in explaining the specific aspects of growth in transition economies. Instead of concentrating only on the real growth of GDP (in constant domestic prices), as is followed by standard economics of the comparative international studies, equal attention should be given to the RER appreciation.

2. Real Exchange Rate is a “Sometime Thing”

In the past two decades the concept of real exchange rate was developed in order to distinguish between nominal (monetary or price) phenomena and the real conditions. Once an indicator as simple as the real exchange rate becomes a fundamental variable, one should be certain that its meaning is stationary in all economic circumstances.

The practice in the field of RER is to a large extent ruled by the PPP (purchasing power parity) in its absolute or relative forms. It is due to the crucial role of relative prices (foreign P^* / domestic P), usually the CPI or PPI, in the most common indicator of RER¹. For a review of RER and PPP issues see Rogoff [1996] or Caves, Frankel and Jones [1993, p. 393]. Many economists have expressed doubts if PPP can be applied on economies in transition. Halpern and Wyplosz [1997] recently provided the most persuasive empirical argument). Generally speaking, this problem is valid in all economies with extensive factor reallocation, production fluctuation and quality changes.

¹ *In order to avoid the trivialisation of the problem one should mention that there are other definitions of the RER which attempt to include alternative variables into the estimate: domestic prices of tradables to non-tradables, relative dollar wages, relative unit labour costs or debt-adjusted RER. Nevertheless, none of them is a complex indicator which would stand alone in all circumstances. All of them are based on an implicit assumption that the law of one price and the homogeneity of products are a valid rule behind all exchanges of tradables.*

Firstly, one can doubt if the transient economies are able to have a meaningful measure of inflation. A large portion of the price changes is misleadingly interpreted as "inflation", instead of taking them for a change in quality or image (or even an introduction of new products). Therefore the difference between the changes in foreign and domestic price levels can be grossly misleading and pointing to improper expectations and wrong policy conclusions. Similarly the statistics of relative foreign and domestic prices (P_i^*/P_i) by products i (as used for the PPP or the real ER estimation) can be misleading because there is an attempt to compare horizontally or even vertically differentiated products. As was analysed by Fontagne, Freudenburg, and Pindy [1998] the quality and the market structure became essential characteristics of the modern trade. That means, with PPP there is often a danger of compare physical products, which are not perfect substitutes. As was argued by Isard [1977], pricing of differentiated products fails the arbitrage test and thus the relationship between exchange rate and relative prices is often statistically insignificant.

Since the transient economies generally do not satisfy this condition and their high degree of specialisation in intra-industrial products of low quality², their index of the aggregate price level in nominal dollar terms must therefore be also misleading. In cases of comparing two economies, each of which is at the opposite corner of the quality competition, the PPP method in fact attempts to solve the problem by transforming the quality competition into mere price competition. The price level divergence between a transition and a stabilised economy of EU can thus lead to wrong conclusions, if one applies mechanically criteria suitable for highly integrated economies with comparable product mix. For example, one can come to incorrect policy implications about the sustainability of the current exchange rate. Also the estimates of GDP per capita, both in nominal Dollar terms and PPP dollar terms, can be thus difficult to reconcile. The catch-up scenarios based on PPP values per capita may lead in such cases to an elusive optimism.

Secondly, price differentials are not the only important variables. A change in the exchange rate can be measured either in nominal terms or in real terms. The former can be caused either by devaluation (in a fixed regime) or by a market fluctuation (in a float regime). The later, on top of the nominal exchange rate changes, also includes the changes in the relative prices levels - such as the inflation differentials between two countries or the different developments in the price levels between domestic tradables and non-tradables. Unfortunately, the problem of exchange rates (ER) is far from being determined by only these variables. Its equilibrium value is also determined by the level of relative productivity growth, relative wages, terms of trade, fiscal spending, tariff and non-tariff barriers, changes in consumers' tastes, capital account disequilibrium, etc.

As a result, **the exchange rate policy cannot be neutral to alternative policy instruments and alternative states of remaining real determining variables**. As pointed by Drabek and Brada [1998], there are also many economic policies, alternative to exchange rate changes that lead to analogous impacts on the behaviour of economic agents. These policy instruments or adjustment variables may be autonomous from price level differentials. A nominal exchange rate can be therefore in equilibrium with a whole set of real exchange rates (e.g. based on given PPI), provided there is an adjustment through various complementary or competing policy instruments or other real autonomous variables. This is a different approach to reasoning, than the traditional one, where the given RER (i.e. the given price inflation) is compatible with only one nominal exchange rate. As Eichengreen [1988] and Hsieh [1982] confirmed, the RER has a higher explanatory power in macroeconomically stabilised economies and economies with harmonised economic development.

3. Econometric Tests of Price Differentials and Trade Performance under Absolute PPP

Even though there can be raised many reservations against the universal validity of the price-deflated RER, one cannot avoid an intuitive feeling that the relative prices must matter, whatsoever relative and partial this concept may be. We can question its relevance only if the empirical evidence is in

² The research by Aiginger [1996a] has disclosed that the price competition in homogenous products and the quality competition in differentiated products present two different aspects of competition that should not be intermixed. In the next study Aiginger [1996b] disclosed that the quality differentials between tradables of CEECs and EU countries are very high.

a direct conflict with its theoretical reasoning. Therefore let us now test a **central hypothesis of RER: that the magnitude of dollar-price differentials between two countries is in a direct relationship with the intensities of exports and imports.**

The index of a relative price differential between Czechia (CZ) and United States (US), as her trading partner, is given by exchange rate deviation index (ERDI) related to the nominal exchange rate ($E_{Kc/\$}$) of Koruna (Kc) to Dollar (\$), and the relative (weighted average) prices of two countries measured in respective **domestic** currencies:

$$ERDI_{Kc/\$} = E_{Kc/\$} * (P_{US}^{\$} / P_{CZ}^{Kc}) \quad (1)$$

Because the term in brackets is the exchange rate in the absolute PPP terms, we can derive from it an alternative formula:

$$ERDI_{Kc/\$} = E_{Kc/\$} / E_{Kc/\PPP$

ERDI remains the same if we use both alternative exchange rates for the calculation of GDP per capita in nominal dollars or in PPP dollars:

$$ERDI_{Kc/\$} = y_{CZ}^{\$ \text{ in PPP}} / y_{CZ}^{\$ \text{ nominal}}$$

y is the Czech (CZ) GDP per capita in US \$ - in international PPP Dollars, and in nominal Dollars, respectively. This is an expression, which can be applied on international statistics of The World Bank or OECD. By using these statistical resources we can compute Czech ERDI for all other currencies. For example, for getting ERDI of Kc to German DM (i.e. between CZ and Germany (D)), we can apply formula:

$$ERDI_{Kc/DM} = y_D^{\$} / y_D^{\$ \text{ PPP}} * y_{CZ}^{\$ \text{ PPP}} / y_{CZ}^{\$} \quad (2)$$

Indices of $ERDI_i$ quantify the price level differentials between Czechia and the respective countries i (respectively their currencies).

If the theory of absolute PPP would have been valid than Czech exports should be directed to countries where ERDI is high – to Switzerland, Denmark and Germany; and imports should be targeted on low-price countries, such as Egypt, India, China or Slovakia. The Czech trade with the former should be in surplus and in deficit with the latter.

The basic hypothesis for testing is given as follows:

$$X_{it} - M_{it} = a_1 + b_1 * ERDI_{it} + \varepsilon_{it} \quad (3)$$

where a , b are coefficients of regression, ε_{it} is random variable,

X , M are Czech exports and imports,

$i = \{1, 2, \dots, 30\}$ are indices of countries (30 main Czech trading partners covering 98% of all

Czech turnover of trade), or their currencies, respectively,

$t = \{1993, 1994, 1995 \text{ and } 1996\}$.

Table 2 offers all necessary data for an empirical testing of the Czech trade with her 30 most important partners during 1993-96. $ERDI_i \neq 1$ means that the $E_{Kc/i}$ is not in parity with the price level in country i . $ERDI_i > 1$ implies an „undervaluation“ of the nominal (market) exchange rate of Kc to the currency of given country i . ERDI is thus the coefficient of “correction” to the level of PPP.

$0 < ERDI_i < 1$ signals an “overvaluation” of nominal exchange rate of Koruna relative to the currency of given country i . The economic meaning of the above test centres around the validity of the theory of absolute PPP. If the ERDIs of Kc differed from 1 in both directions and if the reality would have behaved in accordance with our hypothesis, than the expected coefficients of equation (3) should be $b > 0$ and $a < 0$.

Our tests by using least square regressions both for pooled data for all four years (as well as for annually separated estimations) finished with one uniform conclusion: the relative price levels were relevant for the determination of the Czech trade flows because the zero hypothesis for the coefficients has been rejected. The results for the estimation based on 120 observations were following:

(See Eq. 3 and Fig. 2)

| Statistics | a_1 | b_1 |
|-----------------------------|-------|-------|
| Coefficients | 3009 | -2129 |
| t-statistics | 2.9 | -4.5 |
| probability of 0 hypothesis | 0.004 | 0.000 |
| R-squared + R^2 -adj. | 0.149 | 0.142 |

However, these results are in conflict with the expected signs. Since the test for both the heteroscedasticity and autocorrelation of residuals were in order, the negative slope of b and the positive

intercept indicate that the assumption of absolute PPP must be rejected. Figure 2 shows the data and the fitted line. The discrepancy between the expected relationship and the reality is obvious and cannot be explained solely by data contamination or few overshooting outliers.

Since our hypothesis was rejected, **the results can be interpreted as direct evidence that both the theory of absolute PPP and the theory of real exchange rate based on relative prices were not valid, if applied to the Czech trade in its years of transformation.** The conclusion could be made even stronger: there was an evident tendency to a reversal of the theoretical relationship: the higher prices there were abroad, the more imports were targeted from that country and lesser exports could be placed at such a country.

However, if we accept a hypothesis that ERDI is an index of a gap in quality, good will, marketing, ability to differentiate or a lack in market power, than there will be no paradox in our results. The higher are the foreign prices (relative to our prices), the higher is the foreign quality and thus the more attractive are these goods as our imports. Also countries with high demand for quality have low demand for our inferior goods and thus our exports must be weak. These products, on the other hand, can be sold in large quantities in countries with low quality standards – for example, in countries where they have lower price level than is our price level. High intra-industrial exchanges between countries with unequal standing in quality may bias to a misleading interpretation of these flows. These are not exchanges of similar products, which would be close substitutes, but a trade in highly differentiated non-substitutable and non-competing products, sold on different (parallel) markets. Both the PPP estimate of the GDP or the PPP-based estimate of the real exchange rate do not offer a reliable point of departure for the explanation of dynamics in such countries.

4. Econometric Tests of Trade Performance under Relative PPP

We have seen that the equilibrium ER approximated by a function of the relative gap between nominal domestic and foreign prices (i.e. by the PPP in its absolute form), may not be in some cases a rule to be followed. In our case it led to a controversial conclusion that the more undervalued was the nominal (market) exchange rate (relative to relative prices), the higher was the deficit in the balance of trade. From it one could derive an absurd (and false) prescriptive inference that the balance of trade deficit could be improved by an exchange rate appreciation. The correct inference would be that the balance of trade could be improved if the quality improved – i.e. if the domestic prices increased because of the gains in quality, what would appreciate the exchange rate. Therefore the relative price changes can matter and we should test their relevance.

Actually, our previous test has not dealt with a case how the PPP behaves in its weaker (relative) form. For example, there may still exist a standard positive correlation between a change in ER (which thus shifts relative prices between and inside countries) and the trade performance. That means, we have to test whether the PPP is valid in its relative definition. The concept of ERDI can be transformed into the relative version of PPP by dividing the formula (1) for time t by the same expression for time $t-1$:

$$ERDI_i^t / ERDI_i^{t-1} = (E_i^t / E_i^{t-1}) * (P_i^t / P_i^{t-1}) / (P_{cz}^t / P_{cz}^{t-1}) \quad (4)$$

where i is a list of countries (trading partners), cz indicates Czechia and $t = \{1994, 1995, 1996\}$. **The right-hand side of the equation is the price-deflated formula for the real exchange rate of the Czech Koruna individually tailored to each trading partner i with a one-year lag.**

Let us therefore test a hypothesis that the annual changes in the Czech trade balance by countries i is a function of the real exchange rate developments in the given year t relative to $t-1$:

$$(X_{i,t} - M_{i,t}) - (X_{i,t-1} - M_{i,t-1}) = a_2 + b_2 (ERDI_{i,t} / ERDI_{i,t-1} * 100) + \varepsilon_i \quad t = \{1994, 1995, 1996\} \quad (5)$$

Its interpretation is as follows: the higher is the real exchange rate depreciation in the year t relative to $t-1$, the more internationally competitive the Czech exports to the given country i should be. An opposite development treatment should be expected in imports from i . Thus, after the real exchange rate appreciation net exports to i should decrease in the given year t , relative to the balance in the previous

year. Slope b_2 is thus expected to be positive, provided the relative PPP is valid. The results for the estimation based on 90 observations were as follows:

(See Eq. 5 and Fig. 3)

| Statistics | a_2 | b_2 |
|-----------------------------|-------|-------|
| Coefficients | -9853 | 92.46 |
| t-statistics | -3.20 | 2.75 |
| Probability of 0 hypothesis | 0.002 | 0.007 |
| R-squared + R^2 -adj. | 0.080 | 0.069 |

Though the estimated signs are correct this time, the decreased statistical significance of coefficients and especially very low R-squared does not encourage one to presume that the relative PPP hypothesis is a concept which might have a role as dominant for the explanation of the changes in trade flows, as the literature assumes in that issue. Though it is evident that appreciation had some negative influence on Czech net exports, it definitely has not been able to explain why in the majority of cases a significant appreciation had only a marginal impact on the Czech balance of trade. In our case the effective change of ERDI (real appreciation) was by 29% in mere 3 years, which would hardly any country bear. In 1997 it resulted in a 13% effective depreciation, but in 1998 the nominal exchange for DM recovered close to the level of 1996. We can therefore come with a hypothesis that the convergence of relative price levels between transient countries and developed countries (i.e. the decreasing trend in ERDI) can be taken for a factor with uncertain relationship for the explanation of trade flows, especially if the inflation differential is small. It is evident on the Czech case that the pressure of the exchange rate appreciation was to a large extent balanced by some other factors.

We can also observe that neither the unit labour costs (or dollar wages) nor the relative prices between traded and non-traded commodities evolved during 1993-96 in a way that would compensate for the worsening of the CPI based RER. They all revealed a clear tendency for the real exchange rate appreciation. Actually, there may be cases in the world economy when all alternative indices of RER appreciate and the balance of trade is not sensitive to these adverse changes (as was also revealed by Halpern, Wyplosz [1997]). Though the relevance of the PPP doctrines is paramount in case of hyperinflation, the inflation differential of 3-8% between a transient economy and a stabilised market economy may escape the PPP rule.

5. Real (fundamental) and nominal (monetary) changes

How can we explain that a country may become so insensitive to an adverse RER pressure on her trade competitiveness? The real worsening of the Czech balance of trade did occur, but only in 1996 and 1997. That means it happened with a lag of approximately 3 years and this response was not very strong. What kind of buffers and countervailing factors there could have been which would explain this behaviour? Our explanation is that there were specific circumstances, specific for a transition economy, which cushioned the impact of RER appreciation on the performance of trade:

- The fall in profits and a decrease in the recoupment of depreciation (i.e. in lower cashflow, see Benacek [1997]).
- The bailouts of the National Bank, Ministry of Finance and The Fund of National Property which helped in financing the trade indebtedness.
- Rising indebtedness of exporting firms and firms competing with imports to banks, suppliers, tax authorities and the social security fund.
- The financing of the trade deficit by the surplus at the capital account due to increasing inflows of foreign productive capital.
- A rapid development of non-traded services the prices of which were artificially low (often subsidised). This kind of RER appreciation has only a mild impact on the decrease in the competitiveness of the traded sector.
- Terms of trade improvements, especially from the side of rising export prices, which imply the quality and gains in the market position.
- Productivity improvements.

The first three “cushions” can be coined as financing through unproductive debts, which only postpone the crisis of adjustment. Of-course, not all enterprises or sectors had to solve the challenge of RER appreciation with the above measures of a “slow extermination.” For many of them (but especially for those with FDI - see Benacek [1998]) the main instrument for eliminating the impact of RER appreciation was their growth, quality, price and productivity improvements³. The last two factors are closely related to “fundamentals” and their influence can be just opposite to the influence of the monetary factors⁴. While the monetary inflation under fixed exchange rate is definitely decreasing the competitiveness of exports, the “inflation” caused by changes in quality will increase competitiveness.

What is even more important, while a pure monetary inflation can have an expected elasticity in the (real) exchange rate depreciation of unity, an alleged inflation caused by improvements in quality should in fact appreciate the real exchange rate. Therefore the relationship between differentials in inflation and the exchange rate should not have a constant elasticity of one, provided the given backward country is narrowing the gap in the GDP per capita (in US \$) between her and the developed economies. At some low level of the differentials in inflation this elasticity may even change a sign. The RER is a composite indicator in which both the monetary and the real (fundamental) elements exert their partial and invariant influence.

One can argue that the reason for rather reluctant conclusions in our previous empirical tests was that the models were incorrectly specified. In measuring the trade imbalances $X_i - M_i$ there were disregarded the differences in the turnover of trade. Thus the estimates could have been biased by trade imbalances of few large countries. A theoretically purer approach would be if the net exports were weighted – for example by a turnover of trade:

$$(X_{it} - M_{it}) / (X_{it} + M_{it}) * 100 = a_3 + b_3 * ERDI_{it} + \varepsilon_{it} , \quad (6)$$

Values of the weighted net trade index range in the interval $<-1, 1>$. The higher is ERDI, the higher should be expected net weighted exports. The coefficient b_3 should be again positive, provided the PPP hypothesis is valid. The next table shows the tested results. (See Eq. 6 and Fig. 4)

³ For example, 10% of Czech exports is now realised by Skoda-VW car sales. In mere 6 years the productivity in this company reached the top European level and the quality of assembled parts shot up from preponderantly C-level (in 1992) to 99% of A-level in 1997. The giant tyre company Barum-Continental increased its productivity 10-fold in 9 years, etc. According to Pomery [1997] similar patterns can be observed in approximately a half of the Czech exports.

⁴ Here one should mention that the fundamental approaches to RER have recently tested a wide range of alternatives. Let us mention the study by Williamson [1994], Stein and Allen [1995], Clark and MacDonald [1998], and Frait and Komarek [1999].

| Statistics | a ₃ | b ₃ |
|----------------------------------|----------------|----------------|
| Coefficients | 26.4 | -16.40 |
| t-statistics | 4.16 | -5.72 |
| Probability of 0 hypothesis | 0.000 | 0.000 |
| R-squared + R ² -adj. | 0.217 | 0.211 |

Unfortunately, this alternative did not provide any new insights to our previous estimates. It confirmed that the differences in relative price levels between countries mattered, though the supply response was **negative** - in contradiction with our expected sign. The reversal of our hypothesis was even stronger than in test (3).

ERDI and the importance of relative price levels (as built-in underpinnings of RER), remained an exceptionally controversial variable for the explanation of the behaviour of both Czech exporters and importers. They often behaved in a direct contradiction to the behaviour of those exporters on foreign markets where the conditions of **product homogeneity, their perfect substitutability and perfect competition** were valid. Or, what was more characteristic, their behaviour was indifferent to wide-ranging differentials in relative prices in their partner countries. We can explain it by assuming that higher foreign prices were not acting as an opportunity cost for Czech exporters and thus their existence was more relevant for the decision making of Czech importers than for Czech exporters.

Therefore we can argue that price differentials between countries have their equilibrium level reflecting the gaps in quality and productivity. If the progress in restructuring and catching-up narrows the gap, the appreciation of the RER can take place in order to attain a new equilibrium. One must distinguish between a change in fundamentals and a change in monetary conditions. A gain in competitiveness through a favourable change in fundamentals is associated with a narrowing of the price gap, and thus it is compatible with “inflation”. A gain in competitiveness through a competitive devaluation is associated with a widening of the price gap by mere monetary manipulation. An opposite effect can be achieved by a “competitive” real appreciation due to an inflation as a monetary phenomenon. A permanent parallel combination of an intensive convergence in fundamentals with a modest divergence in monetary (nominal) variables makes the impact of the resulting real exchange rate appreciation on the competitiveness of trade uncertain.

It is often forgotten that the changes in RER for a small highly open economy are closely correlated with the changes in the terms of trade. Some authors (see Kenen [1994, p. 357]) even explicitly define the RER as the reciprocal of the terms of trade. It would be more appropriate for small open economies in transition if their RERs were adjusted also by the changes in the index of terms of trade. For example, if the Czech RER was appreciating by 6% each year and the terms of trade were improving steadily by 4%, than the pressure on the nominal exchange rate to depreciate would be much smaller than one would infer from the differentials in international inflation.

6. Conclusions

We have found out in this paper that empirical evidence does not support a hypothesis that the dynamics of trade of former advanced centrally planned economies was not as sensitive to differentials in international price levels as it was expected for standard market economies. This observation seems to be valid at least during the early stages of economic transition. Neither the absolute PPP and ERDI, nor the relative PPP and RER, have been found to be reliable indicators reflecting the space for real manoeuvring in the allocation of production for both the exports and the import replacements. International relative price differences in such an environment become an elusive concept based often on a superficial comparison of some simple time series. With the exception for a hyperinflation, these indicators are not a good rule for defining an equilibrium exchange rate. In the same manner as the nominal ER higher than ER adjusted to the PPP level cannot be interpreted as a sign of currency undervaluation, one cannot interpret automatically the higher “inflation” at home (relative to abroad) as a sign of worsening in the competitiveness of domestic products. The exchange rate policy and also the expectations of exporters and importers should be based on additional information related to the development in real variables.

Our argument can be generalised and made even stronger. As the doctrine of absolute PPP is nearly completely irrelevant for the quantification of export competitiveness of a country in transition, so one cannot rely on the doctrine of relative PPP. Since the most common indicator of the real exchange rate with relative CPI or PPI inflators is just an extension of the theory of relative PPP, one must be aware of its monetary (nominal) nature. Its meaning for an advancing economy in transition can be very different than for developed, stabilised and mutually well adjusted economies. For example, a real exchange rate appreciation (due to higher „inflation“ at home in the segment of traded commodities) cannot be in some circumstances interpreted as a worsening of the competitiveness of exports. Just the opposite interpretation may hold: increased domestic prices in traded goods can reflect an improvement in external competitiveness, due to changes in quality, image, marketing techniques or gains in the market power. If the gain in competitiveness is even more than proportional to the increase in price, the seemingly appreciated RER may in fact disguise its real depreciation.

The results suggest that not only the statistics of inflation, but also the changes in quality, goodwill, market structure, terms of trade, productivity in tradables and non-tradables, factor endowments, savings and capital account flows should be considered in the assessment of the equilibrium exchange rate.

REFERENCES

- Aiginger K.: The Use of Unit Values for Discriminating between Price and Quality Competition. Cambridge J. of Economics, No. 4, 1996
- Aiginger K.: The Competitiveness of Transition Countries. Indicators of the Qualitative Competition. WIFO, Vienna, WP, April 1996
- Benacek V., Shemetilo D., Petrov A.: Efficiency under Restructuring from a Microeconomic Perspective. In: Restructuring Eastern Europe, Sarma S (ed.). E. Elgar Publ., Cheltenham, UK, 1997
- Benacek V.: Foreign Direct Investment in an Economy of Transition -The Case of the Czech Republic: Evolution, Problems and Policy Issues. Charles University, Prague, Working Papers, 1999
- Bergstrand J. H.: Structural Determinants of RER and National Price Levels: Some Empirical Evidence. Am. Ec. Review, 81, No. 1, 1991, p. 325
- Capek A.: The Real Effective Exchange Rate: The Problems of Construction. Prague, Czech National Bank Papers, No. 77, 1997
- Caves R. E., Frankel J., Jones R.: World Trade and Payments. Harper Collins, N. York, 1993
- Clark P., MacDonald R.: Exchange Rates and Economic Fundamentals: A Methodological Comparison of BEERs and FEERs. IMF Working Paper No. 98/67, May 1998
- Dornbusch R.: Expectations and ER Dynamics. J. of Polit. Ec., 84, 1976
- Drabek Z., Brada J.: Exchange Rate Regimes and the Stability of Trade Policy in Transition Economies. WTO, Geneva, 1998
- Eichengreen B.: RER Behaviour under Alternative International Monetary Orders. Eur. Ec. Review, 32, No. 2/3, 1988, p. 363-371
- European Commission: The Impact of Exchange Rate movements on Trade within the Single Market. European Economy, Reports and Studies No. 4, 1995
- Fabella R. V.: The Debt-Adjusted RER. J. of Int. Money and Finance, No. 3, 1996, p. 475-484
- Frait J., Komarek L.: Long Term Equilibrium Exchange Rate of Koruna and its Determining Factors. Czech National Bank, Discussion Paper, March, 1999
- Fontagne J., Freudenburg M., Pindy R.: Intra-Industry Trade and the Single Market: Quality Matters. London, CEPR Working Paper, 1998
- Halpern L.: Real Exchange Rate and Exchange Rate Policy in Hungary. Economics of Transition, Vol. 4, No. 1, 1996, p. 211-228
- Halpern L., Wyplosz C.: Equilibrium Exchange Rates in Transition Economies. IMF Staff Papers, Vol. 44, No. 4, 1997, p. 430-461

- Havlik P.: Exchange Rates, Competitiveness and Labour Costs in Central and Eastern Europe. WIIW, Vienna, Research Report No. 231, 1996
- Hsieh D.: The Determinants of the RER. The Productivity Approach. J. of Int. Economics, 12, 1982, p. 355-362
- Isard P.: How Far Can we Push the “Law of One Price”? Am. Ec. Review, 67, No. 5, 1977, p. 942
- Kenen P.: The International Economy. New York, Cambridge Univ. Press, 1994
- Pomery C.: The First CzechInvest Annual Survey of FDI in the Czech Republic. Prague, CzechInvest, 1997
- Rogoff K.: The Purchasing Power Parity Puzzle. J. of Ec. Literature, Vol. 36, June, 1996
- Stein J., Allen P. (eds.): Fundamental determinants of exchange rates. Oxford, Clarendon Press, 1995
- Williamson J.: Estimating equilibrium exchange rates. Washington, Int. for International Economics, 1994
- World Bank: The World Report. Washington, 1998

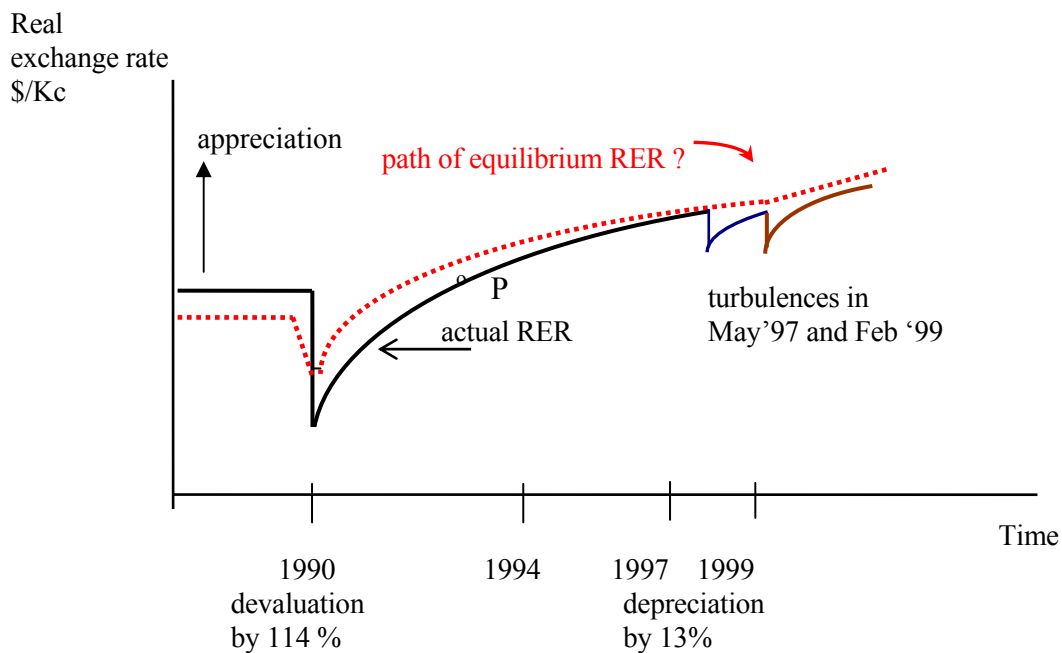
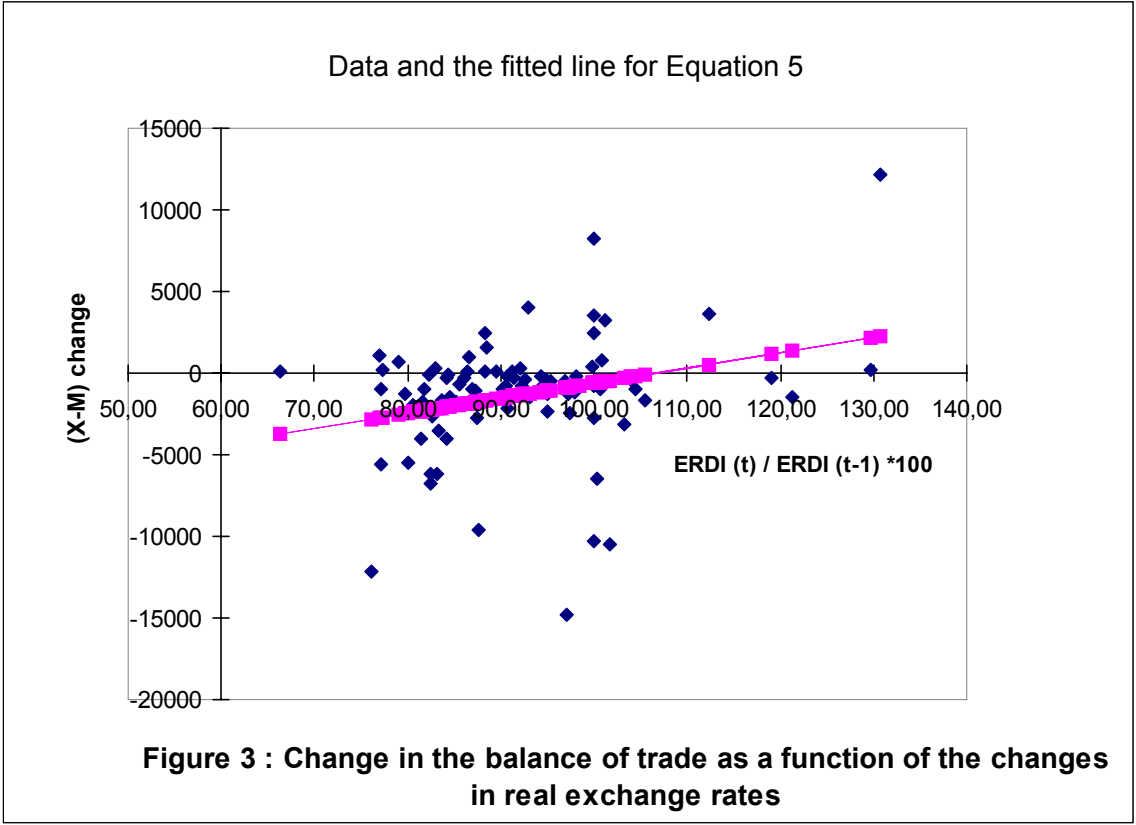
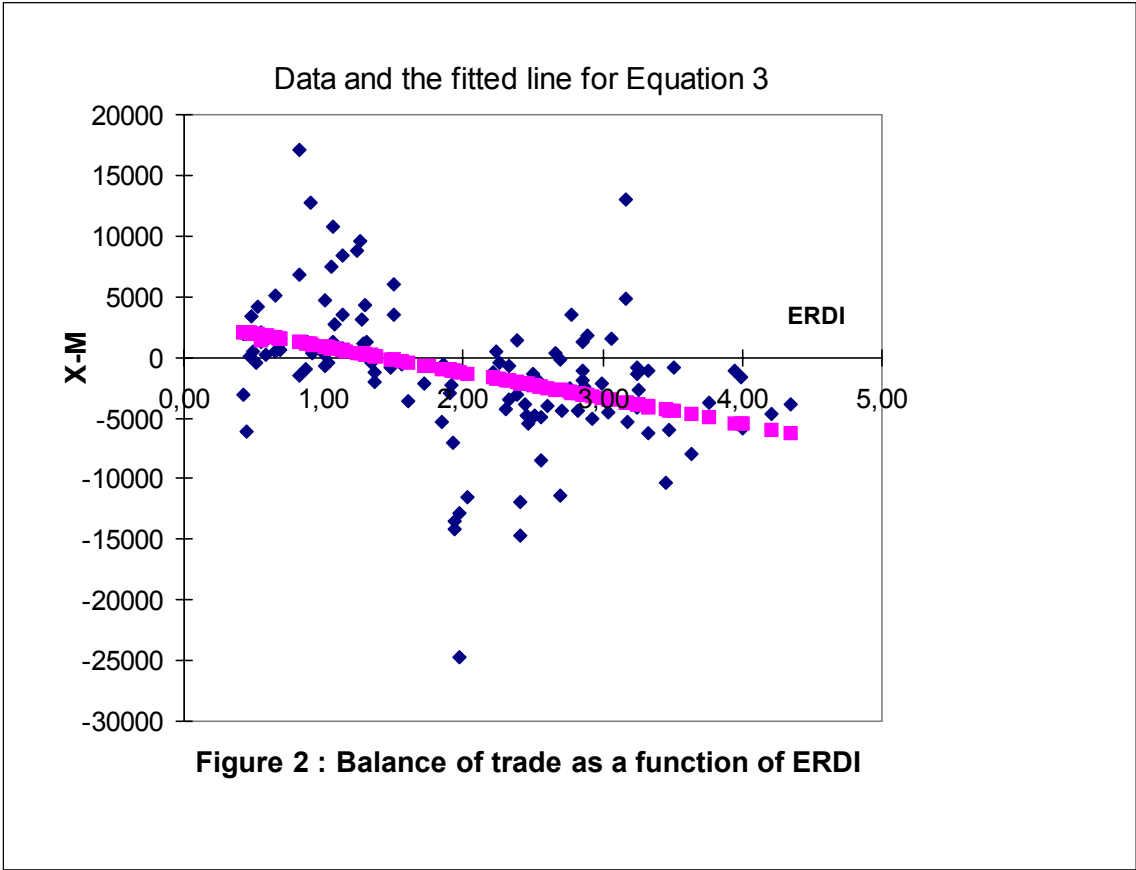


Figure 1: The stylised facts describing the hypothetical trajectory of the Czech real exchange rate (Graph is based on a hypothesis formulated by Halpern and Wyplosz [1997] and adjusted to Czech conditions).



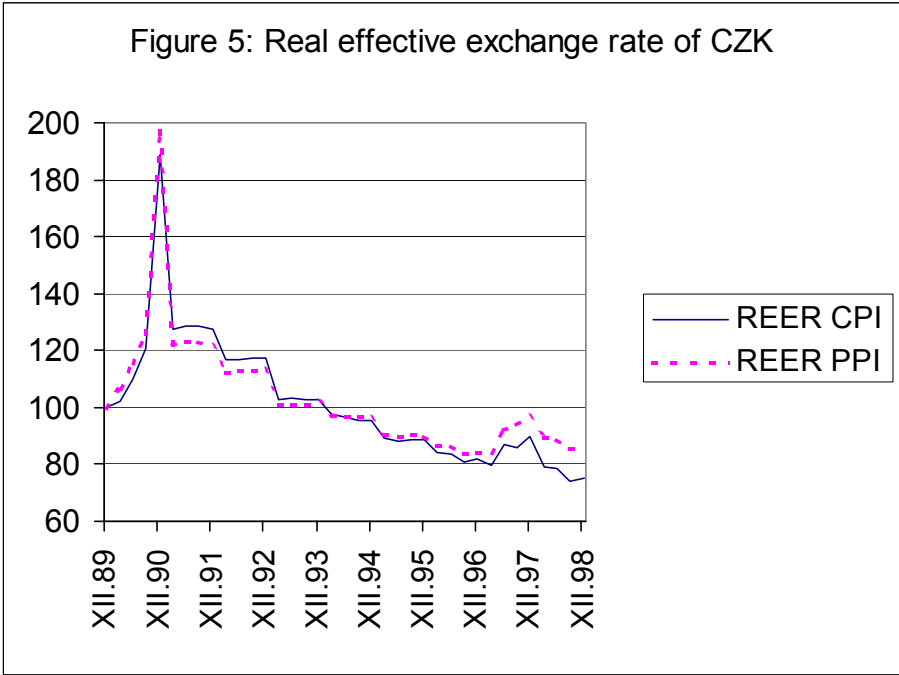
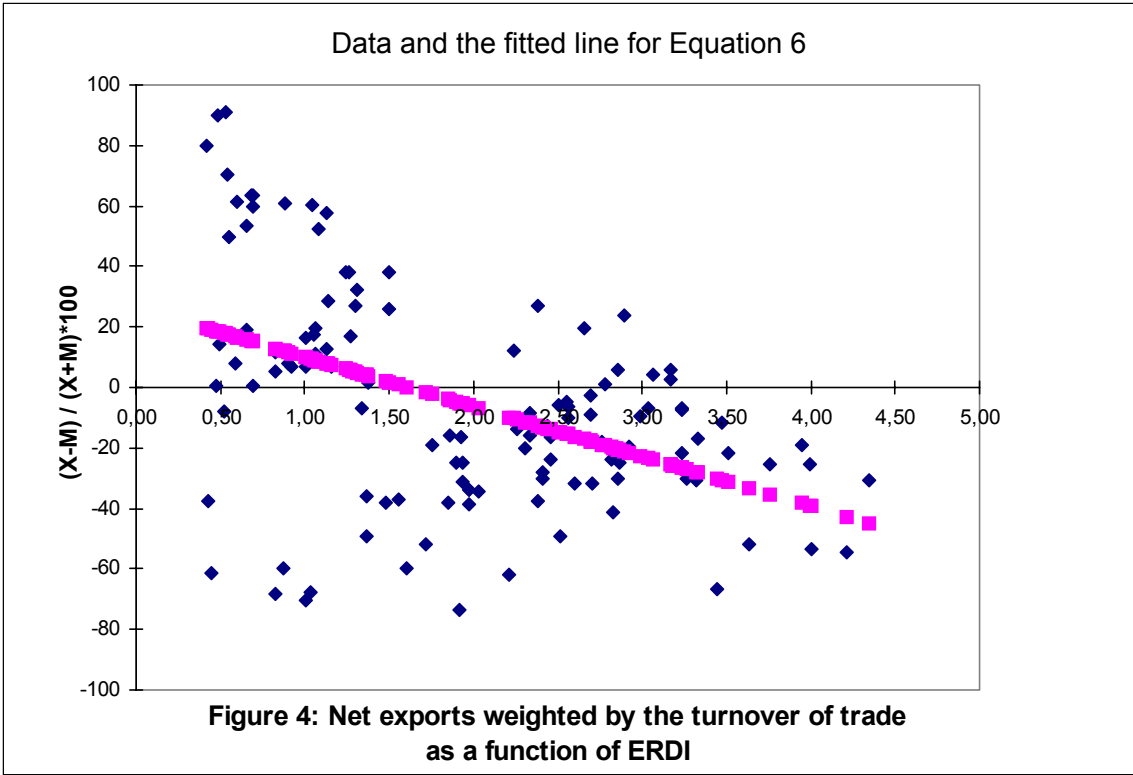


Table 1 : Selected Official Economic Indicators for the Czech Republic in 1989-1998

(21/4/99)

| Indicator | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 ^g |
|--|-------|-------|-------|-------|--------|--------|--------------------|--------------------|--------------------|---------------------|
| Nominal GDP ^a | 524.5 | 579.3 | 749.6 | 846.8 | 1002.3 | 1148.6 | 1348.7 | 1532.6 | 1649.5 | 1777.0 |
| Real GDP ^b % annual change | 4.5 | -1.2 | -14.2 | -6.6 | +0.6 | 2.7 | 6.4 | 3.9 | 1.0 | -2.7 |
| Productivity of labour ^b 1990=100% | 100.4 | 100.0 | 90.7 | 87.2 | 88.9 | 90.3 | 94.3 | 96.9 | 98.5 | 99.3 |
| Real wage (1990=100) | 98.2 | 100.0 | 73.7 | 81.2 | 85.7 | 92.8 | 100.7 | 109.2 | 112.6 | 111.8 |
| Real output of industry ^b 1990=100% | 103.6 | 100.0 | 77.7 | 69.5 | 65.8 | 67.2 | 73.0 | 77.7 | 81.2 | 81.7 |
| Producer price annual inflation % | 1.2 | 16.6 | 54.8 | 9.9 | 13.1 | 5.3 | 7.6 | 4.8 | 4.9 | 2.2 |
| Consumer price annual inflation % | 1.9 | 10.0 | 57.9 | 11.1 | 20.8 | 10.0 | 9.1 | 8.8 | 8.5 | 6.8 |
| Share of savings on GDP % | n.a. | n.a. | 36.7 | 27.4 | 27.3 | 30.1 | 34.1 | 35.5 | 33.9 | 32.2 |
| Share of investment on GDP % | 32.5 | 28.7 | 19.2 | 25.0 | 27.7 | 28.7 | 35.2 | 37.6 | 34.5 | |
| Average wage per month in \$ | 212 | 195 | 142 | 163 | 199 | 239 | 308 | 357 | 337 | 388 |
| % of non-state sector on GDP | 11.2 | 13.1 | 17.3 | 27.7 | 45.1 | 56.3 | 63.8 | 74.7 | 77.0 | |
| Exports (incl. Services) ^c | 16401 | 13833 | 12576 | 13860 | 18952 | 21086 | 28181 ^f | 29870 ^f | 29679 ^f | 32943 ^{df} |
| Imports (incl. Services) ^c | 15482 | 14611 | 11187 | 15860 | 18466 | 21978 | 30016 ^f | 33824 ^f | 32537 ^f | 35465 ^{df} |
| Current account balance ^c | 292 | -721 | 356 | 53 | 456 | -787 | -1369 | -4292 | -3156 | -1822 |
| Nominal exch. Rate (Kc/\$), average | 15.1 | 18.3 | 29.5 | 28.3 | 29.2 | 28.8 | 26.6 | 27.1 | 31.7 | 30.6 |
| Nominal exch. Rate (Kc/DM) | | | 17.8 | 18.1 | 17.6 | 17.7 | 18.5 | 18.1 | 18.3 | 18.4 |
| Real exch.rate DM (PPI) 1990=100% | 100.0 | 124.8 | 125.8 | 119.3 | 101.6 | 98.7 | 97.5 | 90.3 | 87.6 | 82.9 |
| Share of OECD on exports ^e % | 38.1 | 45.0 | 55.8 | 68.5 | 69.9 | 71.4 | 76.8 | 74.2 | 75.1 | 77.0 |
| Exports to EU 12 ^c (goods) | 3423 | 3407 | 4020 | 5402 | 6509 | 7704 | 9406 | 9114 | 13545 ^f | n.a. |
| Imports from EU 12 ^c (goods) | 3412 | 3895 | 3530 | 6108 | 6717 | 8326 | 11747 | 13236 | 16767 ^f | n.a. |

Sources: Statistics of the Czech National Bank (1993-97), Czech Statistical Office (1993-98)

Notes: ^a billion Kc, nominal^b billion Kc, until 1992 constant prices of 1984, since 1993 constant prices of 1994^c million U.S. dollars^d provisional figures for trade^e without trade with Slovakia^f new methodology - including processing traffic and leasing which enhance the figures by 31-39 %, relative to methodology before 1995^g provisional data or estimate for 1998

Table 2: Exchange Rate Deviation Index and Balance of Trade of Czechia

| Country | ERDI | ERDI | ERDI | ERDI | Balance of Trade, mil. CZK | | | | Index of RCA in trade: (X-M)/(X+M) | | | |
|-------------|------|------|------|------|----------------------------|--------|--------|--------|------------------------------------|---------|---------|---------|
| | 1993 | 1994 | 1995 | 1996 | 1993 | 1994 | 1995 | 1996 | 1993 | 1994 | 1995 | 1996 |
| Austria | 3,47 | 3,04 | 2,56 | 2,56 | -6028 | -4486 | -8517 | -4981 | -0,1152 | -0,0700 | -0,1012 | -0,0609 |
| Belgium | 3,24 | 2,76 | 2,31 | 2,33 | -794 | -2591 | -4294 | -3532 | -0,0717 | -0,1786 | -0,2002 | -0,1576 |
| Brazil | 1,56 | 1,48 | 1,37 | 1,37 | -521 | -874 | -1262 | -2008 | -0,3713 | -0,3807 | -0,3589 | -0,4946 |
| Bulgaria | 0,88 | 0,68 | 0,60 | 0,56 | 1232 | 1421 | 1530 | 1201 | 0,6087 | 0,6375 | 0,6145 | 0,4948 |
| Canada | 2,86 | 2,26 | 1,86 | 1,75 | -1070 | -416 | -562 | -760 | -0,2997 | -0,1386 | -0,1603 | -0,1915 |
| Denmark | 3,95 | 3,33 | 2,85 | 2,86 | -1106 | -1174 | -1875 | -2451 | -0,1898 | -0,1716 | -0,2107 | -0,2506 |
| Egypt | 0,53 | 0,48 | 0,42 | 0,54 | 4151 | 3349 | 1905 | 2087 | 0,9105 | 0,9020 | 0,7974 | 0,7034 |
| Finland | 3,51 | 2,83 | 2,38 | 2,51 | -846 | -2789 | -3090 | -4801 | -0,2171 | -0,4130 | -0,3758 | -0,4936 |
| France | 3,24 | 2,92 | 2,41 | 2,70 | -4119 | -5085 | -11871 | -14633 | -0,2184 | -0,1967 | -0,2822 | -0,3009 |
| Germany | 3,17 | 3,17 | 2,78 | 2,70 | 4814 | 13059 | 3481 | -11354 | 0,0246 | 0,0573 | 0,0081 | -0,0259 |
| Hongkong | 2,32 | 2,31 | 2,03 | 1,92 | 1306 | 1342 | -879 | -138 | 0,2571 | 0,2466 | -0,1897 | -0,0239 |
| Hungary | 1,50 | 1,50 | 1,30 | 1,27 | 3539 | 5956 | 4237 | 3085 | 0,2577 | 0,3813 | 0,2679 | 0,1702 |
| China | 0,65 | 0,52 | 0,43 | 0,44 | 5094 | -417 | -3043 | -6176 | 0,5327 | -0,0780 | -0,3775 | -0,6138 |
| India | 0,65 | 0,59 | 0,49 | 0,47 | 464 | 242 | 531 | 16 | 0,1895 | 0,0812 | 0,1410 | 0,0035 |
| Italy | 3,06 | 2,55 | 1,94 | 1,97 | 1465 | -2090 | -14229 | -24768 | 0,0399 | -0,0492 | -0,2496 | -0,3865 |
| Japan | 4,21 | 4,00 | 3,63 | 3,45 | -4628 | -5897 | -8012 | -10362 | -0,5473 | -0,5344 | -0,5197 | -0,6658 |
| Malaysia | 1,03 | 1,01 | 0,87 | 0,83 | -500 | -686 | -955 | -1490 | -0,6793 | -0,7029 | -0,5987 | -0,6816 |
| Netherlands | 3,24 | 2,99 | 2,44 | 2,45 | -1322 | -2130 | -3906 | -4839 | -0,0672 | -0,0936 | -0,1246 | -0,1641 |
| Poland | 1,28 | 1,13 | 1,05 | 1,06 | 1071 | 3552 | 7526 | 10751 | 0,0539 | 0,1280 | 0,1721 | 0,1962 |
| Romania | 1,13 | 1,04 | 0,69 | 0,69 | 728 | 994 | 1135 | 1532 | 0,5741 | 0,6054 | 0,5996 | 0,6331 |
| Russia * | 1,26 | 1,24 | 1,01 | 1,13 | -19641 | -19987 | -33040 | -37036 | -0,3625 | -0,3863 | -0,4966 | -0,4959 |
| S. Korea | 2,21 | 1,92 | 1,72 | 1,60 | -1295 | -2308 | -2176 | -3673 | -0,6181 | -0,7379 | -0,5201 | -0,5969 |
| Singapore | 2,66 | 2,69 | 2,38 | 2,24 | 347 | -188 | 1379 | 418 | 0,1946 | -0,0917 | 0,2703 | 0,1237 |
| Slovakia | 0,83 | 0,83 | 0,69 | 0,90 | 17064 | 6778 | 579 | 12767 | 0,1151 | 0,0533 | 0,0036 | 0,0813 |
| Spain | 2,89 | 2,33 | 1,90 | 1,85 | 1767 | -694 | -2896 | -5344 | 0,2357 | -0,0833 | -0,2474 | -0,3784 |
| Sweden | 3,99 | 3,26 | 2,60 | 2,70 | -1696 | -2679 | -3974 | -4406 | -0,2528 | -0,3033 | -0,3152 | -0,3157 |
| Switzerland | 4,35 | 3,76 | 3,18 | 3,32 | -3932 | -3812 | -5283 | -6266 | -0,3053 | -0,2537 | -0,2580 | -0,3072 |
| Turkey | 1,08 | 1,31 | 1,01 | 0,92 | 2704 | 1208 | 244 | 318 | 0,5232 | 0,3228 | 0,0698 | 0,0691 |
| U. Kingdom | 2,86 | 2,50 | 1,93 | 1,94 | 1287 | -1436 | -7029 | -13452 | 0,0597 | -0,0595 | -0,1616 | -0,3103 |
| Ukraine | 1,34 | 1,16 | 1,38 | 1,06 | -449 | 486 | 175 | 1241 | -0,0712 | 0,0700 | 0,0150 | 0,1133 |
| USA | 2,82 | 2,46 | 2,03 | 1,97 | -4353 | -5447 | -11592 | -12879 | -0,2398 | -0,2359 | -0,3449 | -0,3376 |

* Russian trade without oil and natural gas

Source: A. Capek [1997], World Bank [1997] and the Czech Statistical Office Yearbooks, 1995-98.