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**Exchange Rate Regimes in
the Transition Economies:
Case Study of the Czech
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Exchange Rate Regimes in the Transition Economies. Case Study of the Czech Republic: 1990-1997.

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Abstract: In this paper we re-examine the experience of the Czech Republic with the exchange rate regime during the period 1990-97. We review arguments for and against choosing a peg as they appeared in the early 1990s. Then, we evaluate the success of the peg in curbing inflationary pressures stemming from price liberalization. We also show some of its unpleasant consequences. In the second part of the paper we discuss the macroeconomic precedents which most likely led to the abandoning of the peg in May 1997. Finally, we present some thoughts on possible exchange rate developments, especially with respect to a potential future membership in the European Monetary Union.

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1. Introduction

At the beginning of 1990 Czechoslovakia, as well as other socialist economies were at the start of a new experiment. After forty years of socialist economy a reverse process began. Compared to Hungary and Poland, the so called reform socialist economies, the Czech Republic¹ represented an anti-reform strand in the socialist movement in the 1970s and 1980s. This could probably suggest that compared to these two countries the Czech Republic was supposed to be in disadvantage at the beginning of the transition. However, the socialist reform process was not managed well, and even though it introduced some aspects of the market economy it began to be a liability when the transition process began. It left Hungary and Poland with high foreign indebtedness, medium to high level inflation, rising government debt, excessively powerful trade unions, etc.² Thus, both Poland and Hungary began the transition under much less favorable macroeconomic conditions than the Czech Republic.³ Furthermore, the new Czech economic policy makers could take advantage of the inherited authority of the Czech state, which had been practically unchallenged by non-state interests during the socialist period. Also at the beginning of the transition relative weakness of some other civil institutions such as labor unions, local governments, non-governmental organizations allowed to introduce market institutions in a relatively high speed.

Macroeconomic stability combined with the decisive pro-western and pro-market oriented economic policy and rhetoric has made the Czech transition the darling of international investors and commentators in the first half of the 1990s. Favorable assessments of the Czech experience abounded, and rightly so. Part of this success - at least as it was perceived - was also the Czech exchange rate policy.⁴ A fixed exchange rate regime was introduced on January 1st 1991, and persisted for more than six years. It was seen by some policy makers and by part of the public as a symbol of the Czech success. However, a worsening of the macroeconomic situation in the second half of the 1990s, combined with political instability at the beginning of 1997 and with contagious effect from the Asian crisis led to the abandonment of the peg, and

¹ For simplicity, we use in the text Czech Republic, even though before 1992, the Czech Republic has been a part of Czechoslovakia.

² It seems today that the merits of reform socialism were in weakening the state and the monolithic power structure, and not in promoting macroeconomic stability or higher growth. It is interesting to note that some aspects of socialist reform, e.g. the emergence of small scale private enterprises, which took many years for the reformers to achieve, were quickly and easily achieved in the first years of transition.

³ In the Czech Republic consumer price index did not exceed on yearly basis a 3 percent growth, wages grew slower than the officially measured productivity growth, hard currency debt was comparatively low from 1970 to 1989. Also at the beginning of the transition the monetary overhang at the Czech Republic was lower than in Poland or Hungary. For a more detailed description of the pre-transition macroeconomic situation see Bruno (1993), and Brada and Kutan (1997).

⁴ "... it is safe to say that the Czech Republic's approach [to the exchange rate management] was the most successful," was argued in CEPR/Institute for East West Studies Brief, No.2, November 1996, p.1. We take this quotation from Brada and Drabek (1998, p. 16). "Of all five East European countries, the Czechoslovak stabilization was virtually a textbook case - the initial price shock was followed by relative price stability." Bruno (1993, p.219).

to the introduction of the managed float regime in May 1997. This has changed the perception of the Czech transition performance, and a more negative view of the Czech transition emerged.⁵

In this working paper we intend re-examine the Czech experience with the exchange rate regime(s). In Section Two we discuss some commonly used criteria on how to choose an exchange rate regime and we assess their importance under the Czech conditions. This involves a brief discussion of some optimum currency area criteria, as well as some arguments in the context of stabilization plans. The argument to choose a peg to serve as a nominal anchor in the stabilization package finally prevailed mostly because it was felt that the positive aspects of the transition had to be protected against the effects of high inflation. In Section Three we attempt to evaluate whether the peg was really a success in this respect, i.e. how much it helped in curbing inflationary pressure stemming from the price liberalization. Based on a simple model our estimation shows that indeed the peg was relatively successful in bringing down inflation. In Section Four we show that inflation still remained relatively high compared to the western European countries and we discuss some reasons why this may be so. In that section we also discuss some unpleasant consequences of the peg. Specifically, the fixed exchange rate regime combined with higher domestic inflation led to a real exchange rate appreciation. In addition, the higher domestic inflation rate led to higher domestic nominal interest rates which stimulated the inflow of foreign capital and re-enforced inflationary pressures. Section Five discusses the precedents (signals) of the currency crisis in May 1997, and Section Six briefly discusses the crisis. Section Seven considers some implications for the future of the Czech exchange rate policy.

2. Choosing an Exchange Rate Regime at the Beginning of the 1990s

At the beginning of the Czech transition, the question of the type of the exchange rate regime to be chosen was among the most prominent ones. This was to be decided in an obvious discontinuity to the previous policy regime. The past could not provide a reliable benchmark, but it was also not clear where to look for advice. There were no ready-made solutions for the selection of the exchange rate regimes in transition economies. Furthermore, it was also not clear what should be the new level of the exchange rate. With the advantage of hindsight, in this Section we review this process.

The literature on exchange rate regimes distinguishes three different approaches to the problem. The first approach takes a macroeconomic model and then evaluates which exchange rate regime could ease the response of the economy to different disturbances.⁶ Thus, a country exposed to external nominal shocks should use flexible rates to insulate the domestic economy. On the other hand, a fixed regime can be useful when dealing with domestic nominal shocks, while domestic real shocks are best handled under a

⁵ See for example Buch and Heinrich (1997). The results of 1997 growth rates seem to confirm this view, since Czech Republic was the slowest growing country in the region. On details see Transition Report (1998).

⁶ Following Poole (1970), this literature includes among others Fischer (1977), Flood (1979), Frenkel and Aizenman (1982). For a survey see Argy (1990).

flexible regime. The problem with this approach is that these theoretical results have relatively little practical application since most of the economies face various combinations of real, nominal, domestic and external shocks. It seems that it is not practical to select an exchange rate regime based on this approach, even if the results have serious conceptual validity.

The second approach is rooted in the theory of optimal currency areas. This approach investigates the structural characteristics that determine whether maintaining internal and external balance is better achieved with fixed or floating rates.⁷ We discuss in Section 2.1. the potential usefulness of this approach for the Czech conditions.

The third approach deals with the problem of the exchange rate regime in the context of stabilization plans.⁸ It considers a country with high inflation that wishes to stabilize while minimizing the costs of adjustment. The stabilizing country first needs to correct the source of its imbalances (usually some deficit). However, correction of fundamentals would usually not suffice. Bruno (1991) shows that the corrected system can be consistent with different inflation rates. For this reason a clear signal of a shift in policy is needed, and this is usually provided by a firm nominal anchor. The discussion on choosing an exchange rate regime in the Czech conditions was mostly framed in this context. As the discussion evolved the main consideration for choosing the peg stemmed from stabilization programs with their emphasis to prevent the occurrence of accelerating inflation.⁹ We discuss these issues in Section 2.2.

2.1. Optimal Currency Area Literature and the Czech Experience

It seems reasonable to assume that the working of a particular exchange rate regime will depend on the characteristics of the economy in which the regime works, and this is exactly what the optimum currency area literature intends to study. There are two established results in the optimum currency area literature. One is that a higher degree of flexibility of the exchange rate is most beneficial for countries experiencing different disturbances than their most important trading partners.¹⁰ The second result in this theory is in terms of economic openness: a country with high degree of mobility of factors of production should favor fixed exchange rate regime. This result is then usually extended also to the openness in terms of market of goods and services.¹¹ In the following we ask whether for the Czech Republic the applications of these two

⁷ Ishiyama (1975) and Tavlas (1993) provide useful surveys of the discussion on optimum currency areas. It should be noted that the theory of optimum currency areas is concerned with the choice between the pure float and fixed exchange rate regime, while the economic policy making is usually concerned with the more subtle problem of choosing from different intermediary types of regimes.

⁸ See, for example Dornbusch (1986), Dornbusch et al. (1990), Bruno (1991), and Blanchard et al. (1991).

⁹ Indeed, in the late 1980s in some neighboring former socialist economies there was a visible acceleration of inflation.

¹⁰ This view originates in Mundel (1961). For a thorough discussion see among other Eichengreen, (1994), Kenen (1995, chapter 4.).

¹¹ Guitián (1994, p. 19).

results, and also of some other criteria used in the optimum currency area literature, could lead to some decisive answer concerning the exchange rate regime.

First, we discuss the issue of the asymmetry of shocks. We ask whether the Czech Republic prior to the transition period, was exposed to asymmetric shocks compared to its Western European neighbors.¹² Intuition would surely suggest asymmetry, and thus also the adoption of flexible exchange rates to ease the cost of adjustment to these shocks. This intuition is supported by the results presented in Table 1.¹³ These results indicate that compared to the Western countries the Czech Republic was exposed to asymmetric disturbances.¹⁴ The usefulness of these results is affected by the quality of data as well as by the effect of distorted prices and administrative regimes used in the socialist period, and by the fact that the asymmetry of the past does not need to follow in the future if there is a regime shift. For these reason we repeated the exercise using quarterly data for the period 1990-1997. What is probably a bit more surprising is that this asymmetry prevails also in this period. Compared to the Western European countries the Czech Republic was exposed to different types of shocks both in the socialist period as well as in the transition period.¹⁵ To the extent to which we can infer from these results, it seems that the asymmetry of shocks would have probably required a flexible exchange rate arrangement.

Mundell (1961) argues that if asymmetric shocks prevail, the peg can still be a reasonable alternative if labor mobility is high. Countries with high (low) labor mobility could opt for pegged (flexible) exchange rates. Sufficiently high labor mobility within the country serves to lighten the effect of asymmetric shocks, since it allows workers from regions hit negatively to move to regions which were positively affected. Empirical studies dealing with labor mobility usually measure dispersion of unemployment rates across different regions and countries.¹⁶ Fidrmuc and Horvath (1998) using the data from 1992 for 76 Czech counties show that labor mobility have served to mitigate the effects of asymmetric shocks. However, the size of this effect is in fact very modest. Thus it seems that the labor mobility was not able to cope with asymmetry of shocks and this supports the case for the flexible regime.

¹² We consider as 'neighbors' the Western European countries, since it was quite likely that if a peg was chosen, it would be a Western currency or a basket of Western currencies to which the koruna would be pegged.

¹³ In deriving the supply and demand shocks in Table 1 we followed the approach pioneered by Bayoumi and Eichengreen (1992) who propose a method of identification of supply and demand shocks in a structural vector autoregressive framework. They identify as real supply shocks those shocks which have permanent effect on real output, and as nominal demand shocks those which have only a temporary effect on real output. This approach is far from being non-controversial. Minford (1993) provides a critique of this approach.

¹⁴ We use yearly data on real output and real output deflator for the period 1950-1989. The source for Czechoslovak data is Mitchell (1992). Data for real and nominal GDP (GNP) for western countries are taken from the International Financial Statistics CD-ROM.

¹⁵ Again, the validity of these results could be challenged based on the quality of data. Also as Funke (1997) shows the quarterly estimation using this technique gives lower values also for correlations among western countries.

¹⁶ Results presented by Masson and Taylor (1994) show that among developed countries the dispersion of unemployment is the lowest in the US, higher in Canada, and even higher in European countries. De Grauwe and Vanhaverbeke (1991) show that yearly flow of migrants between the EC countries is less than one tenth of yearly flow of migrants between regions.

Table 1.
Some Criteria of Optimum Currency Area Theory.

	Correlation of Shocks				Openness
	1950-1989		1990-1997		
	Supply Shocks	Demand Shocks	Supply Shocks	Demand Shocks	1988
USA	-0.26	-0.18	-0.27	-0.01	11.2
Germany	-0.02	-0.01	-0.32	-0.12	53.9
United Kingdom	-0.14	-0.11	0.01	0.02	50.1
France	0.12	-0.13	0.12	0.23	42.6
Italy	0.19	0.30	0.24	-0.29	38.3
Austria	0.12	0.13	---	---	74.7
Switzerland	0.05	0.04	---	---	72.6
Netherlands	0.03	-0.04	---	---	105.1
Belgium	-0.12	0.15	---	---	141.9
Denmark	-0.05	0.06	0.12	-0.28	61.6
Spain	0.05	0.26	---	---	38.3
Portugal	-0.30	-0.07	---	---	78.4
Greece	0.15	0.06	---	---	54.5
Ireland	0.01	-0.20	---	---	115.1
Sweden	0.18	0.08	---	---	63.1
Norway	0.10	-0.03	---	---	74.0
Finland	0.00	0.20	---	---	49.5
Czechoslovakia	---	---	---	---	67.8
Czech Republic ¹	---	---	---	---	59.0
Czech Republic ²	---	---	---	---	86.8

Based on yearly data for the period 1950-89, and quarterly data for 1990:1-97:4. The quarterly shocks calculated only for countries which had all data in the given period in the August 1998 IFS-CDROM. Openness calculated according to Summers and Heston (1991) data set as percentage share of exports plus imports in the nominal GDP .

1/ indicates openness in 1991. 2/ indicates openness in 1991 including the trade with Slovakia.

Kenen (1969) argues that for a well-diversified economy the importance of asymmetric shocks will be much smaller than for a less-diversified economy.¹⁷ In Table 2 we present shares of different sectors in the total production for the Czech Republic, Germany and the US. This GDP structure in the Czech Republic is relatively similar to that of the most advanced market economies. The relatively well diversified character of the Czech economy could work towards decreasing the weight of asymmetric shocks.

¹⁷ Kenen (1969, p.49) argues that "A country that engages in a number of activities is also apt to export a wide range of products. ...From the standpoint of external balance, taken by itself, economic diversification, reflected in export diversification, serves, ex ante, to forestall the need for frequent changes in the terms of trade and therefore, for frequent changes in national exchange rates." Thus, fixed rates are "most appropriate -or least inappropriate- to well-diversified economies..."

Table 2.
GDP Structure: Czech Republic, United States, and Germany

	Czech Republic	USA	Germany
Agriculture	6.5	2.3	2.1
Manufacturing	26.7	22.2	38.3
Construction	5.2	5.5	6.1
Mining, Energy and Utilities	10.3	5.8	4.2
Services	51.3	64.2	49.4

Sources: Data for the United States and Germany are from Masson and Taylor (1992). Data for Czech Republic refer to 1993.

The second established criterion in the optimum currency area literature concerns the degree of openness. The more open is an economy, the more it should be inclined to use fixed exchange rate arrangements¹⁸ Data on openness presented in Table 1 show that even under the socialist regime the country belonged to the more open European economies. This relatively high openness, comparable to countries as Austria or Denmark would be probably a strong argument for choosing a peg.

There are also some other criteria used in the optimal currency literature. One of them is the degree of financial market developments. At the beginning of the 1990s the Czech financial market was very thin and relatively underdeveloped. To choose a free float under such conditions could possible lead to a very volatile exchange rate. This argument decreases the practicability of floating regime at the beginning of the transition. Another criterion is the degree of geographic concentration of trade.¹⁹ A high degree of concentration of trade with a large country would probably create an incentive to peg the domestic currency to that of the large country. If Western Europe is expected to be the largest trade partner (see Table 3), it would then indicate the usefulness of some kind of peg to the DM. Fleming (1971) raised the importance of another criterion in the optimum currency area literature. He argues that the similarity of inflation rates between two countries seems to facilitate the implementation of fixed exchange rate arrangements. If two countries peg their currencies but they exhibit very different inflation rates, then this is likely to generate a real exchange rate appreciation putting the balance-of-payment targets into jeopardy²⁰. At the beginning of the transition process it was quite probable to expect that turbulent domestic developments, and possible social conflicts, would lead to higher domestic inflation than in the neighboring Western European countries. Thus, this criterion would suggest the flexible regime.

¹⁸ The classical argument is McKinnon (1963, p.719) who argues that "...if we move across the spectrum from closed to open economies, flexible exchange rates become both less effective as a control device for external balance and more damaging to internal price level stability." McKinnon (1963) also argues that in the highly open economy the money illusion is the lowest. The presence of money illusion is exactly what allows flexible exchange rates to perform their stabilizatory function. This is then another reason why a highly open economy should choose pegged regime.

¹⁹ Heller (1978, p. 311) argues that "a country whose trade takes place largely with one partner country may find it advantageous to peg its exchange rate to the currency of that trading partner."

²⁰ In contrast to this opinion, in the literature on stabilization it is often argued that in case of high inflation, fixed rate regime (nominal anchor) is preferable since it increases the credibility of the stabilization package.

Table 3
Geographical Concentration of Trade

	Exports			Import		
	1993	1996	1997	1993	1996	1997
Market Economies	57.6	63.6	65.5	64.2	70.3	70.9
- EU	52.7	58.2	60.2	56.2	62.4	62.1
Transition Economies	32.6	30.3	29.2	30.7	23.9	22.6
Others	9.8	6.1	5.3	5.1	5.7	6.5

Sources: Czech National Bank.

In this Section we considered the most important criteria suggested by the optimal currency area literature. These results point to some relevant considerations, but they do not have the operational precision needed in a decision making about the exchange rate regime. Our conclusion then cannot be completely definite. We cannot say that 'the theory of optimum currency areas proves that the Czech Republic should follow particular exchange rate regime'. This stresses the importance of the criteria discussed in the next Section.

2.2. Exchange Rate Regime and the Stabilization Program

From the onset of the transition, far-reaching price liberalization became one of the cornerstones of reform strategy. The main objective of the macroeconomic policy during this period was to prevent a rise in inflation in the aftermath of price liberalization, i.e., that an inevitable jump in price level does not affect nominal contracts in the economy and perpetuates the price increase.²¹ To prevent this outcome, it was necessary that future nominal contracts be guided not by the present temporary price jump, but by other variable that would anchor the agents' expectations about inflation. This role of the nominal anchor could be assigned either to some monetary aggregate or to an exchange rate.²² In each case, income policy could be - and it was in the Czech case - used as additional element of the stabilization strategy.²³

A main requirement for successful stabilization based on a monetary nominal anchor is relative stability or predictable changes of demand for money. In the Czech discussion it was expected that the

²¹ This is probably the main difference between the Czech and Latin American stabilization programs. While in the latter, the main task of the stabilization was to bring down persisting high inflation, in the former it was to prevent inflation from erupting. In the Czech situation there were no formal institutional arrangement, such as backward indexation of wages, so there was no need to forget the inflationary memory of the past, since there was almost none. Then the success of the anti-inflationary effort was more a function of the future expectations and the credibility of the government which had pursued it.

²² Fischer (1986) has investigated this question His analysis shows that exchange rate based stabilization is generally less costly than money based stabilization.

²³ Under money based or exchange rate based stabilization programs the wage disturbances can be a serious problem. This was a reason why in 1990, a commission consisting of representative of government, trade union and managers agreed that in 1991 a nominal wage increase will not exceed 5 percent, if the inflation rate is not higher than 25 percent in the first quarter of 1991. Higher nominal wage increases were possible, but a decline of real wages by 12 percent had to be accepted in any case. Excess wages were taxed at a prohibitive rate. New private firms and ventures with foreign participation were exempted from these rules. Wage controls were maintained until July 1995. An attempt to abolish them at the beginning of 1993 had led to excessive wage increase, and to their re-introduction in July 1993.

demand for money during the transition will become difficult to predict.²⁴ Under the circumstances when demand for money underwent large and frequent shifts which were difficult to predict with a reasonable degree of accuracy, there was a risk that the pursuit of a predetermined path of money growth could result in substantial shifts in monetary conditions, and that a given path of growth of some monetary aggregate would not be able to serve as an effective nominal anchor. In addition there was an attempt in 1990 to use money supply (the volume of banking credits) as a nominal anchor, but the experience was that it did not work satisfactorily enough.²⁵ The instability of the demand for money has also represented a particularly pressing problem at times of high and/or variable inflation that prevailed in some countries in transition at the start of price liberalization. Moreover, in many among these countries, there was a widespread currency substitution of foreign for domestic currency. Under such circumstances, monetary aggregates are difficult to use to influence households' and firms' expectations about future growth of liquidity and prices, which could undermine the effectiveness of stabilization based on monetary aggregates.

Using the exchange rate as a nominal anchor instead has several advantages. First, in contrast to monetary aggregates, the exchange rate is transparent, highly visible and easier to understand to the broad public. At the start of the reform, both the government and the central bank did not have any record of policy making under the market system, and their credibility had to be first earned, and for this reason, it was desirable to base the stabilization program on a visible and easy-to-follow variable. A credible nominal exchange rate anchor can also affect inflation expectations, and thereby can increase the effectiveness of the stabilization strategy. At the beginning of the transition the past did not provide clear guide to price and wage setting, and expectations about the future have played a correspondingly more prominent role in this process. If economic agents are confident that the exchange rate anchor will produce price stability or at least low inflation in the future, and if these expectations affect wage and price negotiations, inflation could be reduced and prices stabilized relatively quickly. An additional argument for an exchange rate anchor comes from the experience of some inflationary countries where in the absence of another reliable measuring rod the pricing agents often use the exchange rate as an indicator to which they attach their decisions even if their product is not tradable.²⁶

However, under certain circumstances, exchange rate-based stabilization can have negative impacts on the economy. One objection raised against pegging exchange rate is that at the initial stages of the reform, it is uncertain whether stabilization will succeed, and the fixed exchange rate need not be credible.²⁷ Maintaining a fixed exchange rate that is not credible could require high interest rates that could hurt growth. Another problem of a nominal exchange rate anchor is that after pegging the exchange rate,

²⁴ Begg (1997, p. 39) presents results that indicate that among all countries in transition velocity (ratio of broad money to the GDP) was the most stable in the Czech Republic. This does not of course mean that monetary targeting would be easy, since it always includes some forecast of real output and prices which was a considerably hazardous exercise in the early 1990s.

²⁵ Hrnčir (1993, p.8)

²⁶ This is the so called "dentist effect." See Bruno (1993, p.222).

²⁷ See Blanchard et al. (1991).

inflation in the domestic country would still remain higher than in the country to whose currency the domestic currency is pegged, with possible subsequent (potentially unsustainable) appreciation of a real exchange rate.

A third potential problem with pegging the exchange rate is the need to have a sufficient level of foreign reserves. By tying the value of its currency to another currency, a country commits itself to enter the market to maintain the established parity. This could be done by affecting the demand and/or supply of domestic currency relative to foreign currencies, either by directly selling or buying domestic currency, or by changing interest rates, thereby affecting relative attractiveness of domestic and foreign currency denominated assets. From a practical point of view, relying solely on interest rate policy is not feasible, and a country that maintains parity has to sell or buy its currency from time to time. To be able to do so, it needs to keep certain minimum amount of foreign reserves, or to have immediate access to credit lines. At the end of 1990, when the discussion about the exchange rate regime culminated, the Czech Republic's official reserves fell below US\$ 1 billion, indeed a meager amount to use for exchange rate support. This could have been potentially a large obstacle to the introduction of a credible exchange rate peg.

Nevertheless, compared with the problems of the monetary-based stabilization, potential shortcomings of exchange rate-based stabilization strategy appeared in the end relatively less important, and the Czech Republic has opted for pegging the koruna vis-a-vis the basket of five currencies of countries that played an important role in its foreign trade, and which enjoyed domestic price stability. One factor that weighed in favor of introducing a fixed exchange rate was the financial assistance provided to the Czech Republic by the International Monetary Fund under the stand-by arrangement. During the discussion preceding the program, the Fund argued in favor of using a nominal exchange rate anchor²⁸, and having been aware of the potential vulnerability resulting from low foreign reserves, it organized a major effort to provide sufficient financing to ensure its credibility.

For a peg at least a some convertibility of the koruna was required. There was a considerable risk that strong demand of the residents for foreign exchange when currency had no internal convertibility would lead residents to try to get foreign currency from unofficial sources, driving up the unofficial exchange rate. This could potentially undermine the policy of using the official exchange rate as a nominal anchor.²⁹ Limited convertibility of the koruna was introduced on 1 January, 1991.

²⁸ While in the 1990s there is a definite trend in the world economy towards increased flexibility of exchange rate arrangements, the view at the beginning of 1990s was somewhat different. At the beginning of 1990, there was a growing opinion, reflected also at the International Monetary Fund, that "the enthusiasm for devaluation and active exchange rate policy has gone too far. It has been pointed out that by relying too heavily on exchange rate adjustments, and by allowing countries to adopt administered systems characterized by frequent small devaluations, many adjustment programs have become excessively inflationary." Edwards (1993, p.2). Since transition economies were generally considered to be inflationary prone, to move towards greater rigidity of exchange rate regime was seen as a way to provide discipline into their macroeconomic and financial systems. That these type of decisions have also a "cultural" context can be seen from the fact that couple of years later the CIS-3 countries (Russia, Ukraine and Kazakhstan) adopted the orthodox money based stabilization despite the fact that probably their money demand stability was even more volatile than in the Czech Republic. See Bofinger et al. (1997).

²⁹ (Polak 1991, p 23). For a discussion how convertibility is connected with the exchange rate regimes see among others Williamson (1991), Oblath (1993), and Hrnčíř (1993).

Thus the decision was made to opt for a fixed exchange rate regime with the goal to use this regime as an important instrument of macroeconomic stabilization.³⁰ From January 1991, the koruna was pegged to a basket of currencies³¹ in a 1 per cent band. This regime survived until February 1996 when the band was widened from one to fifteen per cent. In May 1997, after a speculative attack, a managed float was introduced.

After deciding on the exchange rate regime, the next step (which was actually occurring simultaneously) was to decide the level at which the currency should be pegged to other currencies. In the 1980s the official exchange rate was administratively controlled and rather stable, but there were also various parallel and black exchange rates.³² It was necessary to balance two risks. One risk was that an overly depreciated exchange rate would increase the size of an initial price jump after the price liberalization that coincided with the introduction of the peg, and provide a strong impetus to inflation, making subsequent stabilization more difficult and costly. On the other side, a too small initial devaluation posed a risk that the fixed exchange rate regime would not enjoy sufficient credibility because it would quickly result in a current account deficit that could not be sustained. To make things more complicated, large real shocks to the traditional trading partners and dramatic changes in regional distribution of exports and imports increased the uncertainty about future trade balance development. These real shocks added to the uncertainty about the exchange rate that would be consistent with a long-term balance of payments sustainability, and that would at the same time minimize the risk of introducing into the economy an excessive inflation via higher import prices and reduced discipline from foreign competition.

In choosing the initial parity at which to peg the koruna, the authorities ultimately decided to err on the side of undervaluation.³³ The pegged exchange rate regime which was introduced from the beginning of 1991, was in 1990 supported by three considerable devaluations of the koruna³⁴ with the aim to introduce a

³⁰ A peg as a nominal anchor may not be feasible if domestic agents believe that this policy will be abandoned if the costs of maintaining it are too high. Thus, clearly the degree of government's commitment to the regime matters. It is interesting to see in this respect that while the commitment of the government was widely perceived as credible, "the authorities did not commit themselves to any pre-announced period of keeping the exchange rate unaffected." (Hrncir, 1993, p.28).

³¹ The structure of the basket was DEM 45.52%, USD 31.34%, ATS 12.35%, CHF 6.55%, GBP 4.24% from December 1990 until January 1, 1992. From January 2, 1992 until May 2 1993: USD 49.07%, DEM 36.15%, ATS 8.07%, CHF 3.79%, FRF 2.92%. From May 3 1993 until May, 26 1997 the basket was simplified only to include DEM 65% and USD 35%. (see Dedek 1997, p. 32).

³² Hrncir (1993) provides evidence that at the end of 1980s the official exchange rate was around 16 koruna for a dollar, the exchange rate at black market approached 35-40 korunas for a dollar. The high rate at a black market reflected also the demand for foreign exchange for asset holding to hedge against possible high inflation.

³³ Brada and Drabek (1998) argue that this undervaluation of koruna worked as protection through tariffs since it shielded domestic firms from import and gave extra incentives to exporters. Brada and Kutan (1997, p. 109) argue "a large devaluation served to reduce pressures for restructuring in industry, because, with a cheap koruna, more Czech firms in a greater range of sectors were able to export on a profitable basis. The long-term costs may be that investment flows will be directed toward sectors that compete mainly on price rather than on quality, innovation, and other firm-specific advantages, thus trapping the country in a low-wage, low-skill competitive strategy."

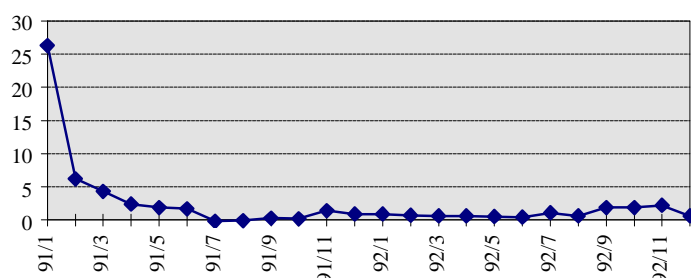
³⁴ In the beginning of January 1990 a unified commercial rate was established at 15 Czechoslovak koruna (CSK) per dollar, while a separate tourist rate of 38 CSK/\$ was still kept. In the summer 1990 the tourist rate was realigned to 23 CSK/\$. In October 1990 the commercial rate was raised to 24 and tourist rate to 30 CSK/\$. Towards the end of 1990

'devaluation cushion'.³⁵ The ratio of official to purchasing power parity exchange rate after these devaluations was approximately three to one.³⁶ Policy makers hoped that tight fiscal and monetary policies would keep inflationary effects of devaluation in check, while minimizing the risk that the parity would be set on a highly appreciated, and therefore less credible and potentially unsustainable level. In the next section we evaluate the success of this policy.

3. How Successful was the Peg in Curbing Inflation?

A comprehensive liberalization of prices was implemented in January 1991.³⁷ Monthly data on inflation in Figure 1 illustrate that as the effect of price liberalization there was a considerable rise in prices in the first quarter of 1991. However, already in the second quarter of 1991 the rate of inflation has declined significantly. A factor which played an important role was that the government had a clear political support, thus it had a window of opportunity to conduct rapid successful stabilization even if costs in real terms would be unthinkable under "normal" conditions.

Figure 1. Monthly Inflation Rate in 1991 and 1992.



In the after stabilization period, with the exception of administered price increases and the introduction of the value added tax, the rate of inflation remained relatively stable throughout the period of the exchange rate peg. However, inflation could be kept relatively low for a variety of reasons, and thus we

the tourist rate was abolished and a unified rate of 28 CSK/\$ was introduced. In other words the koruna was devalued by 16.6% on January 8, by 55.3% on October 15 and by 15.9% on December 28 1990. Hrnčir (1993, p. 14) argues that the first two devaluations represented more-or-less administrative corrections of the existing exchange ratios, rather than proper devaluations, since they were implemented as isolated acts without price liberalization.

³⁵ Oblath (1994) argues that other factors being equal, the further an economy has been from an open trade regime and the more swift and radical is the trade liberalization, the larger is the necessary initial devaluation.

³⁶ According to calculation of PlanEcon (1993) various issues.

³⁷ This covered goods that made up approximately 80-90 percent of GDP. Price regulations were still in effect for some rents, energy, municipal services and for products in some monopolized sectors. This of course means that the government kept some control on the initial price shock. For a discussion, see Brada and Kutan (1997, pp.104-106).

attempt to evaluate the role of nominal exchange rate anchor in curbing inflation. For this purpose we use a simple model.³⁸

Consider an economy which produces two types of goods: tradables and non-tradables. Tradable prices are determined at international markets, while non-tradables at domestic markets, which are assumed to clear instantly. In this stylized economy exchange rate is not fixed, and is adjusted to lagged inflation differentials. Wages depend on adjusted previous and expected inflation. The model is then as follows:

$$\mathbf{p}_t = \mathbf{a}\mathbf{p}_{Tt} + (1 - \mathbf{a})\mathbf{p}_N \quad (1)$$

$$\mathbf{p}_{Tt} = E_{t-1}(e_t + \mathbf{p}_t^*) \quad (2)$$

$$e_t = \mathbf{f}(\mathbf{p}_{t-1} - \mathbf{p}_{t-1}^*) \quad (3)$$

$$N^D(P_N / P_T, z_t) = N^S(W / P_N) \quad (4)$$

$$w_t = \mathbf{g}\mathbf{p}_{t-1} + (1 - \mathbf{g})\mathbf{p}_t^e \quad (5)$$

Equation (1) says that the domestic price level (\mathbf{p}_t) is a weighted average of tradables inflation (\mathbf{p}_{Tt}) and non-tradables inflation (\mathbf{p}_N). Equation (2) states that the rate of change of the price of tradables in domestic currency in period t is equal to the expected change in the exchange rate (e_t) plus the expected rate of world inflation (\mathbf{p}_t^*). Equation (3) says that the rate of devaluation is adjusted by a proportion of \mathbf{f} to the previous period inflation rate differentials. Equation (4) describes the market clearing condition for non-tradables, i.e. the demand for non-tradables is a function of its relative price (P_N / P_T) and of aggregate demand (z_t), and the supply of non-tradables is a function of real wage in this sector. Equation (5) describes the wage process. The rate of change in wages (w_t) depends on lagged inflation (\mathbf{p}_{t-1}) and expected inflation (\mathbf{p}_t^e).

To solve the model and obtain equation (6) we assume that inflationary expectations are rational, thus $\mathbf{p}_t^e = \mathbf{p}_t + \mathbf{m}$ where \mathbf{m} is a random disturbance term. Also for convenience we assume that $E_{t-1}(\mathbf{p}_t^*) = \mathbf{p}_{t-1}^*$, i.e. that expected world inflation equals the world inflation in the previous period. Thus, we obtain (6) as the following:

$$\mathbf{p}_t = \mathbf{a}\mathbf{p}_{t-1} + \mathbf{b}\mathbf{p}_{t-1}^* + \mathbf{g}z_t + \mathbf{m}' \quad (6)$$

In equation (6) coefficient α measures the degree of inertia of domestic inflation. The closer is α to unity the more persistent the inflation will be, the higher will be the degree of inertia in inflation. Edwards (1993, p.7) notes that if $\alpha=1$, the system has no clear nominal anchor and inflation contains unit root. The relatively stable Czech inflation rate does not seem to contain unit root, and this was confirmed also by statistical tests.³⁹ In order to investigate empirically the way in which the nominal exchange rate anchor affected the

³⁸ In deriving the model and then in estimating it we draw heavily on Edwards (1993).

³⁹ Indeed, we tested the null of having a unit root for the consumer price index in levels as well as in log first difference using augmented Dickey-Fuller statistics for the quarterly data for the period 1990:1-1997:4. ADF test statistics using 4

degree of inflationary inertia we estimate the following type of equation using quarterly data for the period 1990:1 - 1997:4.

$$p_t = b_0 + b_1 p_{t-1} + b_2 (D p_{t-1}) + b_3 p_{t-1}^* + b_4 z_{t-1} + u_t \quad (7)$$

where p_t^* is the world rate of inflation, D is a dummy that takes the value of one for the period when the nominal exchange anchor is in place (from 1991:1 until 1997:2) and zero otherwise, and z_t is an index of aggregate macroeconomic policies. If the nominal anchor was perceived as adequate and credible, the coefficient b_2 should be negative and statistically significant at reasonable levels. We approximate z_t by the growth of domestic credit, and world inflation by German consumer price index. Results of the OLS estimation are presented in Table 4. In each equation the coefficient b_2 was negative and significant at the ten percent level. This suggests that the nominal anchor program was effective in changing the dynamics of inflation in the Czech Republic. It also suggests that the public perceived the policy as rather credible. These results also indicate a low degree of persistence in Czech inflation. In comparison, similar equations estimated in Edwards (1993) for Mexico, Chile and Yugoslavia yielded significant point estimates of b_1 in the range of 0.75-0.85. The results did not change significantly if we included a dummy for wage control. Income policy especially at the beginning of the period included some rather drastic limits in wage rate indexation, but of course some degree of wage flexibility was still maintained.

In summary, the results presented in Table 4 support the positive role the nominal anchor played in curbing the inflation rate in the Czech Republic during the period 1990-1997.⁴⁰ However, as we show in the following sections, we have to take the claim about the success of exchange rate stabilization with an ounce of salt.

Table 4.
Regression Analysis. Dependent Variable CPI (π_t)

Independ Variables	constant	π_{t-1}	$D\pi_{t-1}$	π_{t-1}^*	Z_t	Z_{t-1}	R-square	D.W.
Coefficient (Standard Error)	0.032 (0.008)	0.099 (0.190)	-0.460 (0.238)	0.304 (0.848)	-0.071 (0.532)	---	0.906	1.856
Coefficient (Standard Error)	0.026 (0.008)	0.100 (0.191)	-0.445 (0.240)	0.295 (0.343)	---	0.068 (0.119)	0.907	1.798

The time period is 1990:1-1997:4. All equations also include a highly significant dummy for the first quarter of 1991 and zero otherwise. Bold numbers designate statistical significance at 10 percent level.

lags was 0.38 for the level and -7.33 for the first difference. This clearly suggest that at 5 per cent significance level CPI index in level contains, while first log difference does not contain unit root.

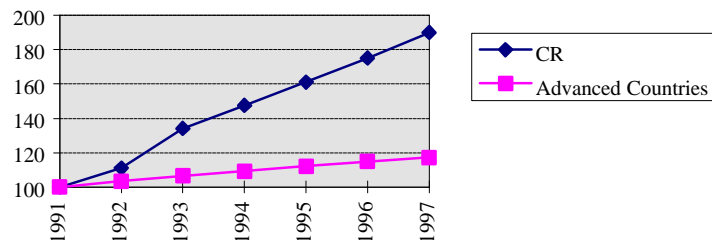
⁴⁰ Brada and Kutan (1997, p.98) present a different opinion. They argue that "the exchange rate has not been a nominal anchor; rather, it has been set so low as to make fighting inflation a relatively secondary issue." However, on page 115 they argue that "the devaluation maneuver must be judged as a success in that the government's objectives were met to the extent that the devaluation was sufficiently large to cushion the effect of the price liberalization, and inflation was reined in so that the nominal exchange rate established in 1991 has easily been maintained."

4. Some Perplexities of the Pegged Regime in Transition

Some economists have criticized the exchange rate-based stabilization in the Czech Republic as implying a too restrictive policy stance, which unnecessarily exacerbated the decline in output triggered by external shocks and dislocations caused by the transition.⁴¹ In defense of the nominal anchor we note that comparing the results of exchange rate and money based stabilization programs in transition countries confirms that a more rapid disinflation in the former has not been accompanied by a more rapid and extensive decline in output relative to the latter group. Citrin and Lahiri (1995) make a point that the decline in output depends also on other factors than the exchange rate regime, and that in transition the importance of these factors will probably outweigh the importance of the exchange rate regime. To judge the importance of the nominal anchor on the decline of output in the Czech Republic is however not the purpose of this paper. We rather proceed in a different direction.

In the previous section we have attempted to argue that the exchange rate-based stabilization program in the Czech Republic has been successful in bringing down the initially high inflation. But this success has been measured by standards of countries in transition, where inflation has been often in double digit or triple digit numbers. Measured by the stricter standards of advanced market economies, inflation in the Czech Republic remained relatively high during the whole period of transition. While these differences may not seem to be dramatic in individual years, they resulted in considerable difference in a cumulative increase in price level in the Czech Republic and advanced economies, as can be seen in Figure 2.

Figure 2. Price Level in the Czech Republic and Advanced Countries



⁴¹ There were two lines of criticism of the exchange rate based stabilization in the Czech Republic. One line focused on the extent of the initial devaluation before pegging the exchange rate. Its proponents argued that the size of devaluation has been excessive, and could have been much less, if the liberalization of foreign trade and of the exchange rate regime proceeded at a slower pace, giving domestic producers more time to adjust. The second line of criticism argued that foreign trade liberalization opens new profitable markets to domestic companies, and main benefits of trade liberalization is the shift of resources from the sector of producing non-tradeables to the production of goods for export. However, fixing nominal exchange rate produces real exchange rate appreciation that reduces the profitability for enterprises of such reallocation.

During six years, the price level in the Czech Republic, measured by the consumer price index has increased by some 70 percentage points more than the aggregate price level in advanced economies.⁴² This has one important consequence: relatively high inflation and fixed nominal exchange rate combine to produce an appreciation of a real exchange rate. While in a particular year, this appreciation does not seem to be excessive, if sustained over a longer period, it produces a substantive movement in a real exchange rate. This could have serious consequences for the country's competitiveness and external balance.⁴³

In the following we try to give some explanations why the rate of inflation in the Czech Republic was higher than in more developed Western economies. However, at the beginning we need to give some qualifications to our effort. We do not intend to perform a comprehensive study of the Czech inflation, and for that reason we do not investigate all the factors which have impact on the behavior of inflation rate.⁴⁴ We rather concentrate on issues which at least tentatively could have implications for the conduct of an exchange rate policy.

First, to the extent that foreign prices remain stable,⁴⁵ fixed nominal exchange rate can stabilize prices of imported goods and prices of domestic goods exposed to competition from imports. However, this is only a tendency. In the Czech conditions due to the fact that the initial level of exchange rate has been chosen below its purchasing power parity, the disciplining effect of a fixed nominal exchange rate on domestic prices began to operate only after the prices of domestic goods increased enough to bring them approximately to the level of foreign prices for a given exchange rate. Furthermore, to the extent that the law of one price does not hold, even approaching purchasing power parity need not produce a strong enough pressure from imported goods to impose limits on an increase in its prices. At least during the first stages of reform, when foreign trade was liberalized and households gained free access to foreign exchange, long suppressed demand for imported goods became temporarily less sensitive to relative prices. This means that particularly in the early stages of transition, the disciplining effect of foreign imports on domestic prices was limited. Only later, as the domestic price level of tradable goods approached foreign price level, and as the initial strong preference for imported goods somewhat waned, did foreign competition begin to exercise a stronger constraint on domestic tradable goods prices. Furthermore, if a nominal peg

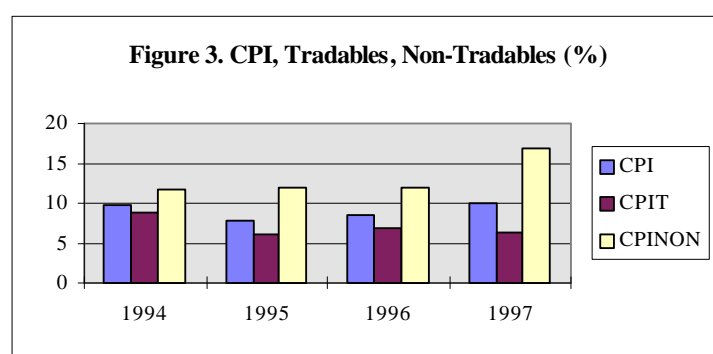
⁴² Using different price indices, like the GDP deflator or producer prices, would produce similar differences. Moreover, we did not include in this measure the increase in price level that took place in the Czech Republic in 1991, the first year of stabilization, which would add additional 40 or so points to this difference.

⁴³ Note that the accumulated difference in price level increase between the Czech Republic and advanced economies does not provide an exact picture about the competitiveness. For example, the koruna could have depreciated against the currencies of other than advanced countries. It is usually assumed that relative unit labor costs are better to gauge developments in competitiveness. Also we need to recall the initial undervaluation of the exchange rate in 1991 and due to it the presence of the so-called exchange rate "cushion". We will return to this issue in Section 5.

⁴⁴ We leave out important and interesting questions as is for example the issue of weak corporate governance and its effect on the excessive growth of wages, and some other issues stemming from the still different microeconomic characteristics of economy in transition. For a more comprehensive study of inflation in the Czech Republic we refer the reader to IMF (1998).

⁴⁵ During the transition period foreign prices of imported goods did not record any significant increase. Also terms of trade shocks did not seem to represent a source of a domestic price increase.

has only limited effect on a price increase in the sector of tradable goods, in the sector of non-tradable goods the effect is even weaker. This view is supported in Figure 3 where we show the annual increase in consumer prices, with separate indices for tradable and non-tradable goods. In all years, price growth in the latter has been noticeably higher than in the former. This, among other reasons, reflects also the gradual catch up of this sector, as some prices in the sector of non-tradable sector are still administratively regulated, and adjusted at different intervals. Given the fact that the non-tradable sector represents about one third of the consumer price basket, this has an effect on consumer price inflation.



Second, Coorey et. al (1996) has paid attention to the role of relative price adjustment and their effect on inflation. Inevitably, transition had to produce a significant realignment of relative prices, as they began to reflect more accurately the forces of supply and demand. One of the reasons why high frequency of changes in relative prices should produce higher inflation is the downward rigidity of nominal prices. It is easier to achieve adjustment of relative prices through different speed of increase in nominal prices instead of through decline in some prices, and increase in others. Because the needed adjustment of relative prices in transition economies is so high, downward rigidity of nominal prices would produce correspondingly higher inflation. It could be argued that in the unsettled conditions of transition, downward nominal price rigidity need not be so strict as in advanced economies, but the fact is that even in these unsettled conditions, we have seldom observed a decline in nominal prices. Even in industries that experience serious declines in demand and output, price indices were growing, though at a slower pace than general price indices.

Third, if real exchange rate appreciation is unavoidable,⁴⁶ then keeping the currency pegged could turn to be a flawed strategy. If the peg is kept against the real forces which push for appreciation, then either the peg sooner or later collapses, or if it is kept, then the pressure will be transformed into an increase in

⁴⁶ The argument for the equilibrium real exchange rate appreciation in transition economies is put forward in Halpern and Wyplosz (1997). They present reasons for equilibrium real exchange rate appreciation as the productivity catching-up in the tradable goods sector due to the Harrod-Balassa-Samuelson effect; the need in transition economies to increase faster prices of non-tradable goods (rents, fees for public services - usually these prices did not increase in the initial stages of price liberalization as much as prices of tradable goods); and the possible improvements in the terms of trade of transition economies as a result of improvement of the quality of their exports.

domestic prices. Thus under these circumstances the nominal exchange rate anchor in fact becomes a source of upward price pressures.

The tendency of the equilibrium real exchange rate to appreciate during the transition could have undesirable consequences for the economy. To see how this could happen, note that relatively low level of economic development, and the catching-up of productivity, typical for successful countries in transition, is accompanied by high marginal product of capital, because the stock of capital available under the market conditions is initially low.

Assume liberalized capital accounts and perfect substitutability of domestic and foreign assets; then the flow of capital in or out of the domestic country depends on whether the condition of uncovered interest rate parity (8) is met.

$$i - i^* = D ER^e \quad (8)$$

If uncovered interest rate parity is to hold, the difference between a domestic interest rate i and foreign interest rate i^* must be equal to expected depreciation or devaluation of domestic currency, DER^e in the given time horizon. If domestic interest rate exceeds foreign interest rate by more than the expected loss of value of domestic currency during that period, it would be profitable for investors to buy domestic assets, and the result would be inflow of capital.

The relationship between the marginal productivity of capital (MPK) and interest rate guiding the investment decision of firms is the following:

$$MPK \geq C, \text{ which implies } DI > 0 \quad C = \dot{i} + d + t \quad (9)$$

where C denotes the net cost of capital, which includes real interest rate (\dot{i}), depreciation (d), and the effect of tax policy (t), and I denotes investment. In transition economies the initial stock of capital that could be profitably used in market conditions is relatively low, and it could be assumed that there exist investment opportunities with high returns. This can imply that marginal productivity of capital in countries in transition will be higher than in advanced market economies, where investment opportunities with high return are more limited. If, for simplicity, we assume that depreciation and tax policy are the same in transition and advanced economies, ($d = d^*$, $t = t^*$), then the fact $MPK > MPK^*$ implies that in countries in transition, investment activity will continue even at interest rates that would eliminate most investment opportunities in advanced economies. Therefore, interest rates in transition countries will be higher than in advanced economies:

$$MPK > MPK^* \Rightarrow \dot{i} > \dot{i}^* \quad (10)$$

Assuming that in transition economies, the equilibrium real exchange rate is appreciating, then over a sufficiently long horizon we can expect that the loss of value of domestic currency is negative, that means, that investors will expect an exchange rate appreciation:

$$D ER^e < 0 \quad (11)$$

Under such circumstances, for the uncovered interest rate parity (8) to hold, domestic interest rate i must be lower than foreign interest rate i^* . However, higher domestic marginal productivity of capital

suggests that domestic real interest rate would be higher than real interest rate in advanced countries.⁴⁷ This argumentation leads to a following contradiction:

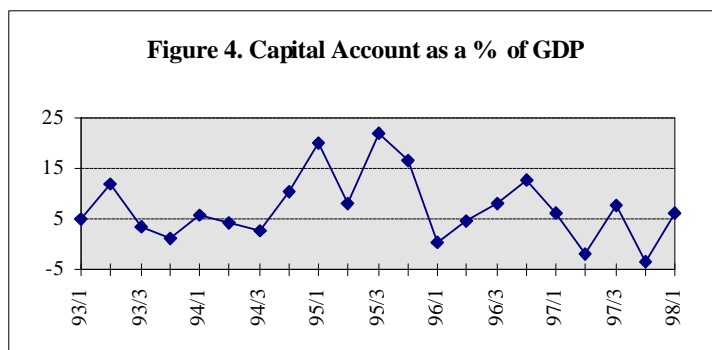
$$D ER^e < 0, \quad i < i^*, \quad \text{and if } P^e > P^{e*}, \quad \text{it follows that } \dot{f} < \dot{f}^* \quad (12)$$

$$MPK > MPK^* \quad \dot{f} > \dot{f}^* \quad (13)$$

Interest rates could be sufficiently low, so that the expected real equilibrium exchange rate appreciation does not trigger foreign capital inflow. But this would result in high domestic investment demand that would outpace domestic savings and need not be met by existing domestic supply capacity. This could produce an overheating of domestic economy, and current account deficit. Conversely, interest rate sufficiently high to match high marginal productivity of capital could trigger large inflow of capital, which could bring its own, and in some aspects similar problems.

Violation of any of the two conditions (8) and (9) activates an adjustment process: the violation of condition (8) triggers a capital movement, i.e., flows on the capital account (inflow of foreign capital), while violating condition (9) triggers more investment in physical capital. Evidently, the violation of condition (8) in the form of movements of financial capital proceeds more rapidly than the response to the violation of condition (9) in the form of new investment in physical capital.

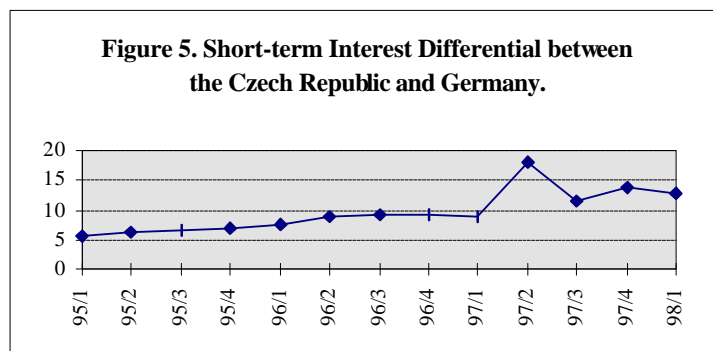
The speed and extent of capital flow that could be triggered as a result of violation of condition (8) is confirmed by the experience of Czech Republic. As can be seen from Figure 4, capital inflow into the Czech Republic during the recent years has been very high, but also very volatile.



Capital inflows, measured by the balance of the capital account, have reached their peaks in 1995 when they approached or even surpassed a 20 percent of GDP (on a quarterly basis). However, in the first quarter of 1996, widening of the fluctuation band of koruna brought capital inflow nearly to a stop, and second and fourth quarter of 1997, capital account balance has been negative, indicating net capital

⁴⁷ The condition of uncovered interest rate holds for nominal interest rates, while conditions (9) holds for real interest rates. However, condition (8) can be rewritten for real interest rates. We can write nominal interest rate as a sum of expected rate of inflation and real interest rate: $i = \dot{f} + P^e$, and condition (8) could then be written as $(\dot{f} - \dot{f}^*) = ER^e - (P^e - P^{e*})$.

outflows. It is interesting to note that these large swings and net outflows of foreign capital took place despite the fact that interest rate differential remained during all this period significantly positive, as can be seen from Figure 5 which shows the difference between Czech and German short-term interest rates.



What does the interest rate differential between the short-term Czech and German interest rates suggest about the future exchange rate of the koruna? If the assumption that equilibrium real exchange rate should appreciate in the course of transition is correct, why is it that the positive interest rate differential, together with the expected real exchange rate appreciation, does not trigger a large inflow of foreign capital? Even if the appreciation of real exchange rate takes place through higher domestic inflation and stable or even slightly depreciating nominal exchange rate, should not it still present an attractive opportunity for foreign investors?

There are several possible explanations why we do not see a steady and massive flow of capital into koruna denominated assets, and why instead the inflow of capital is rather volatile.

First of all, during the transition, market participants need not share the idea that the equilibrium real exchange rate is appreciating, at least over the time horizon relevant for their investment decisions. It is interesting to have a look at the consensus forecast of the spot exchange rate of the koruna versus the U.S. 1dollar, shown in Table 5. Two facts stand out. First, the difference between the maximum and minimum forecast widens significantly with the lengthening of the time horizon of the forecast, indicating a large uncertainty about the koruna/dollar exchange rate. Second, the mean value of the projected exchange rate suggests that on the whole, markets expect koruna to depreciate against the U.S. currency by 10.2 percent over the 12 months and by 6.6 percent over the six months' horizon. Short-term interest rates in the U.S. are some two percentage points over the short-term interest rates in Germany, which means that the interest rate differential of koruna versus U.S. dollars denominated assets should be some two percentage points less than the differential versus the Deutsche mark shown in Figure 5, which is about 10 percentage points. This comes remarkably close to the projected nominal depreciation of the koruna versus the dollar over the next 12 months. At least for the U.S. investors, the combination of the prevailing interest rate differential and the expected depreciation of koruna versus the dollar does not make the investment into

koruna assets more attractive.⁴⁸ To the extent that the U.S. dollar is expected to appreciate against the Deutsche Mark (i.e., the koruna is expected to depreciate less against the Deutsche Mark), and in view of somewhat lower interest rates in Germany, to the German investor, investing in koruna assets could be more attractive than to his U.S. counterpart.

Table 5
Consensus Forecast of Spot Exchange Rate of the Koruna

koruna/US\$	Period	Mean	High	Low
spot 33.29	3 months	33.64	32.25	35.00
	6 months	35.87	33.80	38.90
	12 months	37.07	32.70	42.00

Source: The Economist Intelligence Unit, June 10, 1998.

Another explanation of possible hesitation of foreign investors to buy heavily koruna assets relates to the existence of the risk premium. Uncovered interest rate parity would hold only if domestic and foreign assets are treated by investors as the same with respect to other characteristics than yield. Other characteristics than yield could be captured by a currency risk premium. There are good reasons to assume that foreign investors would consider koruna denominated assets more risky than assets in dollars or Deutsche Marks. That means, the risk premium required by them to hold koruna assets will be positive, i.e. $k > 0$. Therefore, condition (8) has to be modified to include this risk premium.

$$i - i^* = D ER^e + k \quad (8')$$

Uncovered interest rate parity holds if the difference between domestic and foreign interest rates equals expected depreciation of domestic currency plus a risk premium that foreign investors demand to hold domestic (koruna) assets. Besides the traditional credit, market and political risks involved in holding koruna assets, foreign investors have also to assume exchange rate risk. As the consensus forecast in the Table 5 above indicates, there is a large uncertainty about the future exchange rate of koruna, and even though the mean forecasted exchange rate depreciation reflects broadly the current positive interest rate differential, this outcome is quite uncertain, and investors holding koruna assets may well suffer a larger exchange rate loss that projected by the mean forecast. Since the introduction of a managed exchange rate float in May 1997, particularly the short-term volatility of koruna has increased. It was not only the different exchange rate regime, but also external factors, including the turbulence in other emerging market countries and domestic political uncertainties that made future movements of koruna more difficult to predict, and that resulted in the increase of the risk term k .

The increase in the risk premium k required by the foreign investors in order to hold koruna denominated assets could therefore help to explain why despite the sharp increase in an interest rate

⁴⁸ This means that for the U.S. investor, uncovered interest rate parity would hold, as expected exchange rate depreciation exactly offsets a positive interest rate differential. Of course, if they accept the mean consensus forecast of spot exchange rate as relevant!

differential in mid-1997, capital inflow has been relatively moderate.⁴⁹ Capital inflows peaked in 1995, when the Czech economy was still growing strongly, and when there was not yet much concern about the widening current account deficit. At that time the growth of the current account deficit was seen as something natural and even appropriate for a fast-growing country. Even though the interest rate differential at that time was relatively moderate, some 6 percentage points, the exchange rate was stable in nominal terms, and there were few indications that this stability would not continue for some time in the future. While large capital inflows began to complicate monetary policy, the pressure to abandon the peg was not strong initially. It was only after the exchange rate band widened in February 1996 to ± 7.5 percent and the exchange rate uncertainty increased somewhat, that capital flows were reduced despite the increased interest rate differential. In 1996, uncertainty about the future value of the koruna began to increase as the current account deficit continued to widen, fueled not only by high domestic demand and imports, but also by weak export growth that raised doubts about the competitiveness of Czech exports.

From these observations, it seems to us that large capital inflows⁵⁰ that one would expect to follow as a result of violation of condition (8) are, in fact, slowed down by the existence of a risk premium. In response to the violation of condition (8), and at a time when the risk premium is not large enough to close the gap between the relative attractiveness of koruna and foreign assets, large capital inflows ensue which create problems in the economy. That, in turn, results in an increase of the risk premium and subsequent reduction in capital flows. These swings then create tension inside the financial system and increase the vulnerability of the economy.

5. Macroeconomic Precedents of the Currency Crisis and How They Relate to the Peg

In this section we attempt to describe the macroeconomic situation which preceded the collapse of the pegged exchange rate regime in May 1997. We briefly describe the macroeconomic system and how it related to the peg. This includes a brief description of the monetary and fiscal policy preceding the crisis. Then we analyze more in detail two issues that are usually brought up in discussions about the Czech currency crisis: the sustainability of high current account deficit and the effects of continuing real exchange rate appreciation.

After the break-up of Czechoslovakia we distinguish two periods in the transition process from the point of view of exchange rate evolution.⁵¹ The first period (mostly 1994 and 1995) is characterized with continuing capital account liberalization combined with good performance (high growth, balanced budget) and a substantial nominal interest rate differential. This led to high capital inflows. High capital inflows put

⁴⁹ The increase in risk premium has not been limited to the Czech Republic only. After the crisis in Southeast Asia, investors became more hesitant to invest in emerging markets generally. The resulting "flight to quality" has been reflected in reduced capital inflow in emerging markets as a group.

⁵⁰ We need to note that the Czech Republic has by far the most liberalized capital account among the transition economies. In the internal rating by the International Monetary Fund, in mid-1998, on a zero to one hundred scale, the Czech Republic reached a score of 71, while Hungary was second with a score of 55.

⁵¹ On some economic consequences of the break-up of Czechoslovakia, see Fidrmuc and Horvath (1998).

pressure on monetary policy; M2 monetary targets were usually overshoot. Attempts to sterilize the impacts of capital inflows are costly and not fully successful. The higher domestic inflation, given stable foreign prices and fixed exchange rate with tight bands, lead to real exchange rate appreciation and slowly rising current account deficit.

The second period occurred when the central bank attempted to ease these pressures in February 1996 by widening the band of a peg from ± 0.5 to ± 7.5 percents. This potentially higher instability of the domestic currency had some impact on capital flows. There were some periods characterized with outflows of presumably short-term capital. However, a softer income policy lead to a larger real wage increase, and continuing real exchange rate appreciation. Consequently, when the growth slowed down in 1996, the current account deficit rose to high levels. The combined effect of high current account deficit, slower economic growth, continuing real exchange rate appreciation, governmental crisis and possible contagious effects from South-East Asia lead to currency crisis. Thus, as many countries before, the Czech Republic also found it increasingly difficult to build the credibility⁵² needed to sustain a durable fixed regime, and the previous effort to keep the peg was crushed by the market after a few days of speculative attack in May 1997. Consequently the pegged exchange rate regime was abandoned and a managed float was introduced.

In the following we do not attempt to tell the whole story in a more detailed way. Rather we discuss those macroeconomic issues which in our opinion played an important role before the currency crisis. Specifically, we begin with a short discussion of the monetary and fiscal policy before the crisis. It is our opinion, that it is difficult to see how these policies were responsible for the currency crisis. Next, we judge the sustainability of the high current account deficit and the role of real exchange rate appreciation. Towards the end of this section we also mention some other factors which played at least partly a role in the currency crisis. Namely, we discuss the rapid weakening of the right-center government coalition, strong expectations towards devaluation fueled especially by the media, and some problems which stemmed from the imperfect ownership structure of financial institutions, and some other unhealthy signs in the banking and financial system.

We begin with some basic macro-economic indicators in Table 6. Some of the indicators in Table 6 suggest macro-economic stability before the crisis: a sustained growth path from 1994 until 1996; moderate inflation (at least by transition standards); low unemployment; relatively high foreign exchange reserves; and relatively small fiscal imbalance.⁵³ However, quarterly data show that the real growth and the industrial

⁵² An effort to understand the issue of credibility of the peg in the Czech Republic needs to deal with two issues. On the one hand, arguments from the theory and from experienced policy makers as in Bruno (1991, p.24) would suggest the "wisdom of using the exchange rate as a key anchor in the early stages of sharp stabilization but of moving in the direction of a more flexible exchange rate once credibility has been developed." On the other hand, once the credibility of the peg was achieved and experienced it became to be very difficult to move away from it, i.e. to move to a regime where the credibility against needs to be built up.

⁵³ This led for example Bruinshoofd (1997, p.12) to claim that "the macroeconomic outlook at the end of 1996 is quite optimistic about the development of the Czech economy."

production began to slow down approximately from the second half of 1995.⁵⁴ This trend also continued during 1996 and in the first quarter of 1997. Thus, we note that the currency crisis occurred in a period where the growth slowed down considerably, which had a significant effect on the political and social atmosphere before the crisis.

Table 6
Basic Macroeconomic Indicators in the Czech Republic

	1993	1994	1995	1996	1997
	Percentage Change				
Real GDP Growth	0.6	2.7	6.4	3.9	1.0
Consumer Prices	18.2	9.7	7.9	8.6	10.0
Nominal Credit Growth	18.9	16.6	12.7	8.1	2.7
Broad Money	19.8	19.9	19.8	9.2	7.9
Real Wages	3.7	7.7	7.7	8.5	3.1
Unemployment	3.5	3.2	2.9	3.5	5.2
CNB Foreign Exchange Reserves (in millions of \$)	3870	6243	14022	12435	9773
Gross External Debt (in millions of \$)	8500	10700	16500	20800	21350
CZK/DEM	17.64	17.75	18.52	18.06	18.28
CZK/US\$	29.16	28.78	26.55	27.14	31.71
	In Percent of GDP				
Fiscal Balance	1.3	0.4	-0.7	-1.0	-1.7
Government Gross Debt	15.8	13.8	11.5	10.2	10.9
Convertible Currency Debt	24.7	26.8	32.6	36.9	41.0
Foreign Exchange Reserves as % of Import	19.8	27.0	44.5	34.6	28.0

Source: Czech National Bank.

Monetary Policy and Fiscal Policy before the Currency Crisis

Eichengreen et al. (1995,p.253) conclude that "devaluations generally occur after periods of expansionary monetary policy." Clearly, excessive money creation is incompatible with maintenance of a fixed exchange rate regime for an extended period of time. However, it is difficult to describe the Czech monetary policy before the crisis as excessively expansive. While the peg with large capital inflows narrowed the room for independent monetary policy, the widening of the exchange rate band in February 1996 reduced the attractiveness of koruna and gave slightly more freedom to the central bank. As a result, Czech monetary policy changed its stance in 1996: from a more accommodating to a more contractionary policy.⁵⁵ This change in the monetary policy stance could be hardly interpreted as a move which would

⁵⁴ See Hajek et al. (1997).

⁵⁵ In August 1996 the central bank increased the discount rate from 9.5 to 10.5 percent, and the lombard rate from 12.5 to 14 percent. At the same time the central bank also raised the obligatory reserve ratio from 8.5 to 11.5 percent. These measures slowed down the nominal growth of money supply. Domestic credit expansion in the second half of 1996 and

inspire speculators to increase their pressure against the koruna. On the other hand, this argument can be weakened if it is argued that the slower growth in 1996 and in the first quarter of 1997 was perceived by the market as a potential incentive to use a more expansionary monetary policy in the future. This fear was indeed supported by the public debate in Spring 1997 in which some representatives of the government took a position of criticizing the tight monetary policy of the Central bank.⁵⁶

Krugman (1979) and Flood and Garber (1984) argue that inappropriate fiscal policy is at the root of speculative attacks. In these models, budget deficits are financed with increased credit. The empirical implication is that before the crisis we should observe worsening of fiscal position and continuous depletion of reserves. The Czech fiscal policy is usually characterized as a prudent one. In the transition period the budget was always projected as balanced. The outcome was usually a small and diminishing surplus or a small deficit. However, as seen in Table 6, the fiscal position was worsening from 1995 when the balance went into deficit of approximately one percent of the GDP.⁵⁷ In Table 6 we present data also on official foreign currency reserves. Reserves built up in 1994-95 due to large capital inflows and despite the worsening of current account balance. However, in the second half of 1996 reserves began slowly to decrease. The ratio of foreign currency reserves to import was in the first quarter of 1997 lower than in 1995-96, but was on the level of 1994, which means we cannot observe clear worsening in this respect. In summary, we are of the opinion that while we observe certain worsening of fiscal positions and also decrease in foreign exchange reserves before the crises, overall it seems that the fiscal position was healthy.⁵⁸

Next, we discuss in more detailed form the issue of sustainability of the current account deficit.

in 1997 was not strong in real terms, thus there was no danger of creating an asset bubble as it happened in some other countries preceding their currency crisis.

⁵⁶ Dedek (1997, p.25) gives an explanation of the tension between the government and the Central Bank. "The quarrel was about what reasons led to the growth deceleration and the subsequent shortfall of tax revenues in the first quarter of 1997. The government blamed the monetary tightening made a half year ago. In contrast, the central bank pointed to several unhealthy trends in the economy such as widening current account deficits, an excessive real wage growth outstripping the increase in labour productivity, a weaker fiscal discipline. A combined effect of these unfavourable trends threatened to revive inflationary pressures that gave the mandate for monetary tightening." Dedek also notes that at the same time IMF criticized the CNB for not being enough determined to reduce inflation.

⁵⁷ What is not clear is the extent of disguised forms of deficit financing. The official state budget ignores the budget of local governments, which are also in deficit. There is also some anecdotal evidence which suggest that more properly measured fiscal deficit was larger than officially announced.

⁵⁸ Begg (1997, pp.15-16) is of different opinion. He argues that the basically balanced fiscal position in 1996 and the intention to keep this position for 1997 was not sufficient, and that fiscal policy was supposed to be tightened to achieve budget surplus. His argumentation rests on the fact that if policy makers decided to keep the peg in spite of worsening competitiveness the crucial for the success of their endeavor was to achieve the confidence of foreign investors until "substantial physical investment had time to be reflected in productivity." And since competitiveness would remain a concern, fiscal policy had to be tightened to remove overheating and allow correction of the fiscal-monetary mix.

Sustainability of the Current Account Deficit

Contrary to most transition economies, which experienced large current account deficits after the collapse of the Soviet system, the Czech current account exhibited relatively small surpluses (deficits) in the period of 1991-93. This picture begins to change from 1994 when the growth begins to speed up. At this time, the pegged exchange rate regime, high nominal interest rates, and increased confidence in the international markets led to massive inflow of capital, an increase in foreign exchange reserves and a balance of payment surplus. These large capital inflows also stimulated domestic demand and together with weak corporate governance, which fueled real wage growth, led to negative balance of trade, especially in 1996 and 1997. This changing character of the current account is demonstrated in Table 7.

Table 7
Balance of Payments of the Czech Republic
(millions of U.S. dollars)

	1993	1994	1995	1996	1997
Current Account	455.8	-786.8	-1369.1	-4292.2	-3155.8
Capital Account	3024.8	3371.1	8225.9	4296.7	1081.9

Note that in 1993-1995 on the current and capital account combined there was a surplus, i.e. there was an excess demand for koruna. Since the country was on fixed exchange rate regime the central bank was intervening in the foreign exchange market in order to decrease pressures for a nominal appreciation of the currency. This was one of the factors which lead to increased foreign exchange reserves, i.e. excess demand for koruna - which would otherwise put pressure on the exchange rate - was accommodated by the central bank's purchase of foreign exchange. This current and capital account combined surplus vanishes in 1996, and in 1997 changes into deficit, i.e. into excess demand for foreign currencies. Source: CNB

It is rather difficult to distinguish between current account deficits that reflect positive transformation changes, and thus are sustainable, and those that are not.⁵⁹ We evaluate the sustainability of the Czech current account deficit first by presenting it in international context. As a sample of comparison we have chosen some South-East Asian economies which also underwent currency crisis in 1997. Table 8 indicates that in 1996 the Czech ratio was not only higher than the IMF implicit criterion of 5%, but higher than in Thailand, or Malaysia, i.e. in countries which underwent serious economic problems in 1997.⁶⁰ In addition, in

⁵⁹ Milesi-Ferretti and Razin (1996) advice to distinguish between solvency, 'excessive' current account deficit, and sustainability of current account. Intertemporal budget constraint for a country states that a country is solvent, i.e. does not go bankrupt when the present value of country's resource transfer to foreigners equals the value of its initial debt. Subject to this constraint the Czech current account deficit even in 1996 and 1997 does not need to imply insolvency, since all what is needed is that there will be sufficient current account surpluses in the future to pay off the initial foreign debt. See Obstfeld and Rogoff (1996, pp. 66-70). The concept of 'excessive' current account deficit can be used in the context of a model that forecasts 'equilibrium' path of external balance, to which then the real path is compared. It seems that this concept, while very useful is less suitable for the examination of real world financial crises. We focus on the latter concept, i.e. we attempt to assess the most important operational indicators of the Czech current account deficit sustainability.

⁶⁰ This type of comparison serves mainly illustrative purposes, since for example the Baltic states had higher current account deficits than the Czech Republic and in 1997 did not experience currency crisis.

the first quarter of 1997 (just before the crisis) the deficit widened further. Such a high ratio of deficit to real output is clearly a signal of worsening economic situation⁶¹, but without assessing the sources, composition and some other characteristics of the deficit we cannot attempt to give an opinion about its sustainability.

Table 8
Current Account Balance as a % of GDP. Czech Republic and Selected Asian Countries

	1993	1994	1995	1996	1997
Czech Republic	-0.1	-1.8	-2.9	-9.2	-6.3
Korea	-0.1	-1.4	-1.9	-4.9	-1.8
Indonesia	-0.8	-1.5	-4.2	-3.4	-1.8
Malaysia	-10.1	-11.5	-10.0	-5.0	-4.8
Philippines	-6.6	-3.7	-4.4	-4.8	-5.2
Thailand	-6.5	-7.2	-7.9	-7.9	-2.0

Source: Smidkova et al. (1998), various.

Sources of the Current Account Deficit

National income accounting indicates that a current account deficit reflects the excess of investment demand over national savings. This deficit results either from an increase in investment or from a fall in savings. Under normal conditions excess investment demand can be a consequence of healthy economic growth leading to high investment ratios and potentially to future growth. But excess investment demand can also be a result of a high consumption boom which lowers national savings. This has clear implications on the deficit sustainability. Generally, we can expect that a current account deficit which is accompanied by a fall in savings rates will be more problematic than a deficit accompanied by rising investment rates. Data in Table 9 show that for example in 1994 the ratio of savings and investment to GDP roughly equaled. In 1995 both ratios increased, but the investment increase was much higher. The situation changes to a more negative one in 1996, when the increase in investment is combined with decrease in savings. This can be considered a negative phenomenon.

Table 9
Savings and Investment Rates in Czech Republic

	1993	1994	1995	1996	1997
Savings/GDP in %	18.4	28.0	29.6	28.5	28.4
Investment/GDP in %	16.4	30.1	34.4	35.5	33.9

Source: CNB.

The slower growth of savings can occur through the slowing down of either private and/or public savings. The slowing down in public savings means higher budget deficit and is considered potentially more menacing than a fall in private savings. The reason is that a fall in private savings is more likely to be transitory while structural public sector deficits are often hard to get rid of. In the Czech Republic the relatively high current account deficit did not reflect public sector dis-savings, but rather insufficiency of

⁶¹ Smidkova (1998b, p.14) provides an interesting anecdotal evidence from "Emerging Markets Biweekly," issue 97/10 by GoldmanSachs. In this report comparing twenty-six emerging market economies in 1996, the Czech Republic had the highest ratio of current account to GDP in percentage. The recommendation of GoldmanSachs for foreign investors was to stay short in their koruna positions.

private savings relative to investment. Under 'normal' circumstances there probably should be no concern. Under the Czech conditions, however, two issues need to be raised in this respect.

First, it can be argued that the insufficiency of private savings was due to an artificial increase in consumption as weak corporate governance fueled wage increases. This claim is rather difficult to evaluate systematically, but, if valid, it could be a recipe for bankruptcy, since it could imply consumption spending above the marginal productivity of labor.

Second, the picture gets rather more complicated if we look at the character and the conditions under which investment is occurring. There are still some considerable problems in the Czech banking and financial system, which relate to problems of moral hazard and over-investment. It is of course known that financial intermediaries whose liabilities are guaranteed by the government pose a problem of moral hazard. In the Czech Republic no such explicit guarantee exists; however, the fact that the state was for the most part in control of the main commercial banks; could lead the management of these banks to behave as if they would be protected from risk. This seems to be at least partly validated by experience and by anecdotal evidence that some financial intermediaries undertake excessively risky investments.

The current account deficit is also an expression of the excess of domestic spending over domestic production, which partly means that the country is borrowing from abroad to finance acquisition of goods and services. How are the borrowed funds used? Generally, we can say that if borrowing is undertaken to purchase durable goods or productive equipment and not to finance current consumption with debt, then the current account deficit could be a reasonable option. We do not have a definite answer to the question what is happening in this respect in the Czech Republic. Clearly only time will show what really the payoff of these investments will be.⁶²

Composition of the Current Account Deficit

A current account deficit may be less sustainable if it originates from a large and persistent trade deficit, than when it originates from a deficit of net factor income. There are two reasons for this. First, a persistent trade deficit may indicate competitiveness problems, while a negative net factor income balance may be a remnant of some past incurred debt. Second, the ability to pay off the debt will be affected in the future by the ability to generate foreign currency receipts which will depend on future export performance. The composition of the Czech current account deficit as seen in Table 10 indicates that the current account deficit originated in trade deficit. The factor income balance was also in deficit, but in a much smaller scale than the deficit of the trade balance.

⁶² Begg (1997, p.13) raises a skeptical view when he writes: "... the failure of high investment under central planning to generate sustained and rapid growth reminds us that market incentives and corporate governance are critical in translating greater availability of capital into larger output from capital. Whether the Czech Republic could make effective use of new investment was to some extent still unproven."

Table 10.
Composition of Current Account Deficit in Czech Republic
(in millions of USD)

	1993	1994	1995	1996	1997
Current Account	-53.5	-744.8	-1362.3	-4291.6	-3155.8
-Balance of Trade	-479.8	-1339.2	-3677.9	-5877.3	-3452.2
-Balance of Services	1010.8	488.3	1842.0	1923.0	1165.2
-Balance of Investment Incomes	-117.5	-20.2	-105.6	-722.5	-504.5
-Transfers	-467.0	126.3	579.2	385.2	236.4

Source: CNB.

In summary, the composition of the current account deficit seems to be relatively unhealthy, and probably not sustainable in a longer time horizon. This can also be said about the source of the current account deficit. The source of the current account deficit was in falling savings rates. However, this slower growth of savings rate was not the result of unreasonable public sector deficit, but rather of increased private consumption.

Real Exchange Rate Appreciation

Some recent studies⁶³ show that real exchange rate appreciations play a prominent role among the useful indicators in anticipating currency crises. Before we analyze the issue in the Czech context, we note that appreciation of the real exchange rate is a fact for most transition economies whether they use pegged or floating exchange rate regimes. Two views emerged in the literature to cope with this issue. The first view sees the appreciation of the real exchange rate as a sign that transition countries are losing their competitiveness on international markets, which sooner or later transfers itself into current account deficits. The second view considers a real exchange rate appreciation as a correction of earlier depreciations, and as a result of higher productivity growth in the traded sector. Thus, the actual appreciation represents also an appreciation of the long-run equilibrium real exchange rate, and does not represent a misalignment. Under these conditions, the worsening of the current account is seen as a quasi optimal response to the underlying structural changes in the economy.

Some data concerning the development of the Czech real exchange rate are given in Table 12. These data suggest a persistent real exchange rate appreciation of about 30-40% between 1992 and 1997, and approximately 15-20% between 1989 and 1997. The different estimates show that the real exchange rate was appreciating irrespective of the method of calculation.

⁶³ See, for example, Kaminsky, Lizondo and Reinhart (1997) and Milesi-Ferretti and Razin (1996).

Table 12.
Appreciation of the Real Exchange Rate

	1993	1994	1995	1996	1997
Real Exchange Rate Based on CPI Data; 1992=100 *	117.9	122.0	125.4	132.6	136.0
Real Exchange Rate Based on CPI Data; 1989=100	81.6	95.2	102.0	118.3	116.5
Real Exchange Rate Based on PPI; 1992=100 *	118	122	125	133	142
Real Exchange Rate Based on PPI Prices; 1989=100	95.1	102.0	110.3	118.3	116.5

Source: CNB. *Brada-Drabek (1988).

Lazarova and Kreidl (1997) estimated the behavior of equilibrium real exchange rate and came to conclusion that in the third quarter of 1996 the real exchange rate was appreciated approximately by 10-13%. Smidkova (1998b, p.26) provides a sophisticated evidence that the real overvaluation of the exchange rate compared to its equilibrium was in the end of 1996 between approximately 6 and 11 percents in the expansive scenario, and between 2 to 8 percent in the restrictive scenario.

As we argued in Section 2, the exchange rate was heavily devalued in the beginning of 1991. This was a substantial weakening of the koruna and it created a large cushion to prevent a loss of competitiveness in the first years of transition. Thus, while the real exchange rate appreciated and we observe signs of worsening competitiveness, it is difficult to argue that the Czech economy lost its competitive edge as a result of real exchange rate appreciation. Furthermore, there were also substantial productivity gains in the manufacturing sector. It would require a more elaborate analysis to determine to what extent manufacturing labor productivity tend to offset the impact of real appreciation, and thus to see how much real appreciation played a negative role in preceding a crisis. However, it seems quite clear that for market participants the real exchange rate appreciation was perceived as getting out of line. This was a factor which helped the nominal anchor slowly to lose its credibility, forcing a tightening of monetary conditions to sustain it.

Political Instability, Expectations and Transition Specifics

Kenen (1996) argues that while bad policies play a role, the onset of a currency crisis is frequently due to a political shock that lead agents to revise their view about a government's ability to improve its policies. This is partly true also for the Czech case. Towards the end of 1996 and in the first quarter of 1997 the combination of slower growth, a worsening current account deficit, and a deteriorating fiscal position, intensified tensions inside the ruling coalition. Political instability caused uncertainty about the future economic environment, and led to an increased lack of confidence. This did not seem to be welcomed by markets. Market participants began to revise their views about the government's ability to change its policies. Also, foreign investors became more susceptible to the risk of policy reversal, since the conservative government was likely to be replaced by a left-wing oriented government with rather excessive

rhetoric and without previous governing experience. Expectations of a new government filled the media discussions. Furthermore, the decreasing popularity of the conservative government was weakening their determination to implement adjustment measures which would jeopardize their future electoral chances. The introduction of the 'package'⁶⁴ to deal with the problems in April 1997 was understood as a sign of this weakening, and further undermined the credibility of the government among domestic and foreign financial players. These are all rather unclear matters but they indicate that the change in the political environment contributed to the currency crisis.

Finally, we mention some transition specifics which seemed to play a rather negative role in the evolution of the crisis. In the Czech Republic, financial intermediation is still dominated mostly by banks. While the role of alternative financial intermediation is increasing, deposits at banks and bank loans are still the main source of financing. Furthermore, large commercial banks are excessively involved in the ownership of private companies, mainly through their role in running voucher privatisation funds, and keeping decisive equity stakes in industrial and service state companies. These banks are simultaneously creditors of these companies.⁶⁵ This gives inadequate incentives to creditors to force performance improvement in companies and it also weakens the application of bankruptcy laws.

It is a fact, and a success, that financial markets developed with immense speed. It seems, however, that the conservative government was overconfident in the allocative power of basically unregulated financial markets. Financial markets were rather poorly regulated until the currency crisis, and several scandals broke out during 1996 and early 1997 signaling poorly supervised financial institutions. Clearly, in this respect the legal areas were developing much slower than the rest of financial institutions.⁶⁶

In the following Section we briefly describe the currency crisis.

6. Short Description of the Currency Crisis in May 1997

The Czech currency market was relatively stable from the early years of transition. There was no realignment (devaluation) in the Czech Republic during its pegged exchange rate regime in the period from January 1991 until the currency crisis in May of 1997.⁶⁷ The currency crisis itself was much less spectacular

⁶⁴ The government attempted to deal with the worsening situation in a stabilization package introduced in April 1997. Besides restrictive fiscal policy measures the package contained also administrative measures to curtail imports (an obligatory non-interest-bearing deposit for a half year for 20 percent of import of selected consumer goods).

⁶⁵ We note for illustration that the share of classified credits in total standard credits is approximately 25-30 percent of the total credit.

⁶⁶ For example the Securities Commission came to exist only after the currency crisis. Another problem is the relatively low degree of transparency in financial and banking transactions. We note that currency crisis have occurred also in Sweden, in a country which has highly transparent economic system and advanced institutional framework. Thus, transparency is not enough to guarantee a healthy financial system, while of course a lack of it can contribute to the problems.

⁶⁷ It is tempting to ask whether fixing of exchange rates for such a long period is simply feasible in the world of rapidly growing capital markets. Obstfeld and Rogoff (1995, p.8) provide us with a tentative answer. They argue that it is a misperception to deduce from the large volume and trading in foreign exchange and capital markets, that if speculators decide to attack a currency of a small country, the central bank has no way to resist. They argue that most central banks have access to enough foreign exchange reserves to "beat down a speculative attack of *any* [*italics in original*]

than, say, the Asian or the current Russian crisis. For this reason, some doubt could be raised whether 'currency crisis' is the right term, especially since in the Czech Republic and also in some IMF documents the expression 'exchange rate turbulence' is used for the events which occurred in May 1997. We follow the common definition, which says that currency crisis is such situation which "entails a speculative attack which causes the exchange rate to depreciate or forces the authorities to defend it by radically raising interest rates or expending reserves."⁶⁸ As we will show both of these conditions occurred in the Czech Republic in May 1997.

As we attempted to document in the previous sections, there was some worsening of fundamentals in the Czech Republic before the currency crisis. Consequently, this led to political tensions inside the ruling coalition as well as to (sometimes public) discussions between representatives of the government and of the central bank, in which the central bank was urged to ease its monetary policy stance. These tensions worsened the atmosphere and created nervousness on the market. The government in April 1997 attempted to introduce a 'package' which was supposed to deal with the worsening fundamentals (preliminary results of the growth in the first quarter were discouraging⁶⁹) and was supposed to increase the perception that the government is decisive in dealing with the worsening situation. However, the 'package' was accepted quite coldly, and markets did not calm down.⁷⁰ These domestic tensions became to be aggravated by contagious effects coming from the beginning of 1997 from South-East Asia, especially Thailand.⁷¹

How did the koruna respond to these pressures? As Figure 6 documents the strengthening of the koruna continued at least until the middle of February 1997.⁷² The koruna then began to weaken

magnitude, provided they are willing to subordinate all the other goals of monetary policy. To defend a currency peg, the monetary authorities only need enough resources to buy back the high-powered monetary base, equal to deposits at the central bank plus currency. In practice, of course, a central bank never would need to buy up the entire base to repel a speculative attack. By reducing its monetary base sufficiently, the central bank can raise interest rates to a level so high that speculators will find it prohibitively expensive to go short in the domestic currency." Our calculations show that at the beginning of 1997 the Czech National Bank had enough foreign exchange reserves on hand to buy up approximately 80-90 percent of the monetary base. In addition, the central bank could use some other arrangements to borrow more foreign currency. The real problem then is not the technical ability to defend the peg, but rather what consequence it will have on the rest of the economy.

⁶⁸ Eichengreen, Rose and Wyplosz (1995).

⁶⁹ In April 1997 the Czech Statistical Bureau revised its 1997 GDP growth forecast downward from 3.5% to 2.9%, and revised upward its forecast of inflation in terms of consumer price index from 8.2 to 8.8%.

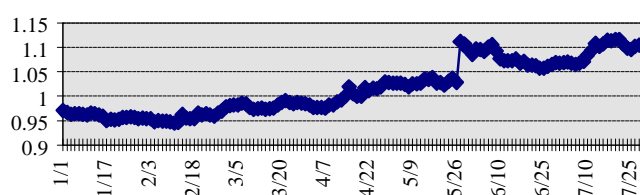
⁷⁰ Dedek (1997, p. 26) gives an interesting explanation for this fact. "While the government was stressing the growth objective behind the stabilisation programme, the central bank supported it primarily as a more balanced mix of restrictive policies that better served disinflation objectives on the background of a large external imbalance. Many commentators would agree that the growth rhetoric of the government was one of the reasons why the package failed in averting the speculative attack because markets suspected the government of not being honest about fulfilling austerity measures while pressing on the central bank for interest rate cuts."

⁷¹ While it is definitely difficult to prove the idea that the Czech currency crisis was triggered by the events in Thailand, it appears consistently in papers dealing directly or indirectly with the Czech currency crisis. See Smidkova et al. 1998, IMF (1997), Transition Report (1998).

⁷² This appreciation was partly driven by capital inflows responding to high interest rate differentials, and thus increased demand for the korunas. At the beginning of 1997 issues of Eurokoruna bond also contributed to the appreciation of the

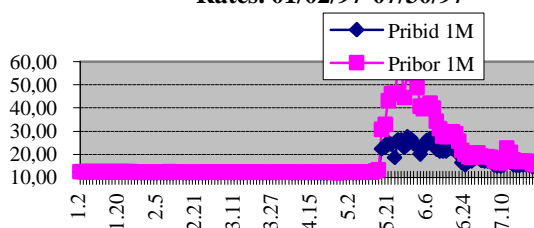
approximately from the second half of February. However, this weakening was not accompanied until the beginning of May with other signals which would indicate the emergence of a currency crisis. This is seen in Figure 7, where the interest rate spread on interbank deposits (the difference between Pribor-Pribid) rate is low and stable until mid May. Also from approximately the beginning of the year there was a steady increase in foreign exchange deposits by domestic residents, which signaled expectations of a possible weakening of the koruna.

**Figure 6. The Koruna Exchange Rate.
02/01/97-07/30/97**



Note in Figure 6., 1.00 denotes the central parity, movements below the parity represent appreciation.

Figure 7. One Month Pribor - Pribid Interest Rates. 01/02/97-07/30/97



Explaining the timing of the speculative attack seems to be very intricate. Smidkova et al (1998) shows that the crisis began on May 15, 1997 and was concluded on May 26, 1997 when the Czech National Bank announced the change of exchange rate regime, and introduced a managed float. In this period there was a large increase in credits denominated in koruna to non-residents. These were paid back towards the end of May, i.e. after the crisis. At the onset of the crisis (May 15) Czech Central Bank intervened heavily⁷³

koruna. At the period of appreciation of the koruna the Czech National Bank did not directly intervene in the foreign exchange market, but it tried to push koruna towards the parity by issuing statements that the koruna's appreciation is not consistent with the macroeconomic fundamentals. See IMF (1998, p.50-51).

⁷³ To restrain short-selling the central bank used unsterilized foreign exchange interventions and used repo tenders to decrease liquidity in the market. Interventions of the central bank on forward markets were not successful since forward markets simply ceased to exist. IMF (1998, p.51) state that the interventions sales amounted to US\$ 2.5 billion. During the crisis the central bank did not impose capital controls, and was able to borrow in foreign currency and to arrange a credit line with foreign banks, which was however not used. See Smidkova (1998) and IMF (1998) for details.

in the foreign exchange market. This stabilized the exchange rate at approximately 3% under the central parity. During the currency crisis the Czech National Bank was able to keep the koruna well in the official band ($\pm 7.5\%$). The koruna depreciated above the band limit only on May 27th, the first day when the managed float was already in action.

From the onset of the crisis the Czech central bank began to increase its interest rates. Repo rates rose to 75 percent, the central bank marginal overnight lending rate increased on 22nd May to almost 200 per cent. There was also some informal pressure on commercial banks to restrain the access to koruna for non-residents. After approximately a week it was clear that the expectations among foreign and domestic players had not changed much. Domestic residents began to sell koruna and to hoard imported goods. Thus even if the Czech National Bank was able to keep the exchange rate well in the fluctuation band, it became clear that this could not be prolonged for a long time period. Investors did not believe that the central bank is willing to stay the course, and in this case even the most resolute defense of the peg will not do it.

After the currency crisis market calmed down rather quickly, interest rates landed softly. Market perceived the policy efforts of the Central Bank as adequate, thus the crisis of confidence did not persist for a longer period of time and did not spread from the Czech Republic to neighboring countries.

In summary, worsening of fundamentals combined with growing political instability and the expectations of devaluation, and possible contagion effects intensified the depreciation pressures and triggered the attack on the koruna in mid-May 1997. Initially the Czech Central Bank attempted to endure the depreciation pressures through interest rate increases and foreign exchange intervention. However, approximately after a little more than a week, the central bank decided to change the regime, and to introduce a managed float. The decision to abandon the peg before the position of the central bank was compromised helped to build an early return to relative exchange rate stability. We are of opinion that even without the speculative attack it was exceedingly difficult to keep the peg, and the speculative attack only speeded up the collapse. This seems to be also the opinion of the former prime minister⁷⁴ who today argues that the devaluation and the change of the exchange rate regime should have happened approximately one year before the crisis.

In the final Section we present some thoughts about the possible future exchange rate developments in the Czech Republic.

7. In Lieu of Conclusion: Some Thoughts on the Future Exchange Rate Developments in the Czech Republic

As a result of the crisis in May 1997, the Czech National Bank introduced a managed float regime. While the central bank does not announce any targets for the exchange rate of the koruna, it did not

⁷⁴ Klaus (1997).

withdraw from the market.⁷⁵ Under the present circumstances, a large degree of exchange rate flexibility seems to be warranted, in order to provide a certain level of autonomy to monetary policy, and to avoid the recurrence of speculative pressures. However, in the future, an important question will have to be answered about the implications of the prospective membership in the European Union for the exchange rate policy in the Czech Republic. Even if participation in the EU will not be initially connected with the participation in the European Monetary Union, the introduction of the common European currency, the euro, and the accession to the EU will have significant implications for the Czech economy, and for the choice of its exchange rate regime.

In June 1998, the interim government published a document outlining broadly the economic policy strategy in the accession to the EU.⁷⁶ This document argues, that in principle, the Czech Republic can join the European Union with any exchange rate regime. In deciding whether to peg the koruna again, probably vis-a-vis the euro, several factors will have to be taken into account. There should be a reasonable guarantee that the risk of renewed macroeconomic disequilibrium that would threaten the sustainability of the new peg has been significantly reduced. This includes both internal and external equilibrium. From the internal perspective, the Strategy argues that a visible progress has to be achieved first with disinflation.⁷⁷ Presently, the inflation rate still results to some extent from the gradual deregulation of the remaining centrally controlled or regulated prices. This process and the resulting effect on the inflation cannot be controlled by monetary policy. It is argued that the large gap between domestic and foreign price levels remains still mainly as a result of lower domestic prices of non-tradeables, and this implies a continuation for some time of a positive inflation rate differential against the EU countries.⁷⁸

Another factor that has to be taken into account before deciding on pegging the exchange rate is the capability to ensure a wage growth that would not be in excess of inflation, and that would not undermine a pegged exchange rate through the wage-push inflation. While this may have been true in 1996 and 1997 on an annual basis, evidence shows that wage behavior has changed in the second half of 1997 and during early 1998, with a sizable slowing down of nominal wage growth, manufacturing real wages⁷⁹ nearly flat, and

⁷⁵ The Czech National Bank undertakes a foreign exchange intervention whenever it considers that the market is moving the koruna too much or too quickly in one or other direction. Also, the Central Bank makes occasionally public its views about the appropriateness of the existing exchange rate. For example, in June and July 1998, its officials expressed concern about the excessive appreciation of koruna that does not reflect the fundamentals. However, it is not an intention of the central bank to defend certain level of the koruna, be it explicit or implicit.

⁷⁶ This document is called *Economic Strategy of Joining the European Union: Starting Points and Outlines of Solutions, Prague*, July 1998. There was no official document of a similar character before, which probably reflected the widely held view among Czech policy makers that first the more elementary EU accession criteria should be fulfilled, and only then the question of nominal convergence criteria should come into forefront. However, as Dedek (1997b) argues after the currency crisis is, that the feeling that the Czech Republic is integrated into the global setting began to be more widely held.

⁷⁷ From January 1998 the Czech National Bank, as the first central bank among transition economies, began to use inflation targeting.

⁷⁸ See Janackova (1997).

⁷⁹ Real average wage grew 6.1 percent in the first half of 1997, but slowed down to 3.1 percent in the second half of 1997, and fell 0.6 percent in the first quarter 1998.

productivity increasing briskly. The wage deceleration seems to be the result of (1) tight fiscal policy and the large decline in public sector real wages; (2) weakening domestic growth and tighter financial situation in the private sector; and (3) most importantly, undergoing structural changes in the corporate sector, where improved corporate governance seem to be preventing a continuation of wage growth that would be in excess of productivity growth and that would undermine financial position of the enterprises.

Another set of preconditions before pegging the exchange rate concerns the external balance. In the official government document, it is argued that external debt has to be reduced first, and so has the current account deficit, to a level that could be broadly financed by the inflow of foreign direct investment. It is also suggested that as an interim step, the euro could replace the deutsche mark as a reference currency in monitoring the exchange rate (and arguably responding to eventual excessive movements in the exchange rate). On a more fundamental basis, an argument can be made that there is a whole range of factors that speak in favor of maintaining monetary policy autonomy for some time in the future. The Czech Republic is still a transition economy, which has to go through a significant structural changes and restructuring on a micro level.⁸⁰ The case for keeping a more flexible exchange-rate arrangement at least in the near future rests then on the argument that the economy still suffers from chronic structural weaknesses which limit its adjustment flexibility.⁸¹

However, while there are definitely certain preconditions before pegging the koruna to the euro after joining the EU, there are arguably many advantages that this peg could entail after these preconditions are met. We have already discussed the pros and cons of the pegged exchange rate regime from the perspective of optimal currency area and of macroeconomic stabilization. Dedek (1997) provides a long list of reasons why the Czech Republic should strive to achieve exchange rate stability. He emphasizes notably the potential benefits from the point of view of capital account transactions, by providing stability to long-term investors. Moreover, in the Czech Republic, the business sector is a net holder of foreign liabilities, and large exchange rate depreciation could affect adversely domestic firms and banks.

The emergence of the euro as a common currency of eleven European countries would dramatically increase a single currency trade area. While foreign trade with Germany represents about one third of total foreign trade of the Czech Republic, foreign trade with the future euro area is about 2/3 of total trade. This large increase in the size of the anchor economy expands the potential benefit from maintaining the exchange rate stability. However, we would argue that in the future, the stability of the exchange rate of euro vis-a-vis the U.S. dollar or the yen could be much lower than the stability of the Deutsche Mark. First, the introduction of euro is likely to trigger large shifts in investors' portfolios, producing exchange rate movements. Secondly, the euro area will be much more closed to foreign trade due to an increase of the intra-euro trade, with the consequence that the monetary authorities are likely to accept larger exchange

⁸⁰ In 1997 unemployment surged to record high 5.2 percent compared to 3.5 percent in 1996. This trend continued also in 1998 when in April unemployment reached 5.4 percent. This seems to reflect not only slower demand for labor, but especially the faster rate of hitherto delayed restructuring in the industry.

⁸¹ See Janacková (1997), and Sachs (1996, pp. 150-151).

rate volatility. Pegging to euro could therefore produce larger movements in the dollar prices in the Czech foreign trade (like oil and gas), and the net effect on the stability of prices could be reduced.

To sum up, we think that in the distant future, say in the horizon of 5-10 years, pegging the exchange rate of the koruna to the euro could bring important benefits, and would be a realistic option. However, as the recent experience with the fixed exchange rate regimes has forcefully illustrated, unless a number of conditions is met, the fixed exchange rate could easily become a source of major financial instability, with negative consequences for the real economy.

References

- Argy, Victor, "Choice of Exchange Rate Regime for a Smaller Economy: A Survey of Some Key Issues," in Argy, Victor and Paul de Grauwe, *Choosing an Exchange Rate Regime: The Challenge for Smaller Industrial Countries*. International Monetary Fund, Katholieke Universiteit Leuven, Macquarie University 1990. pp. 6-81.
- Barth, Richard C. and Chorng-Huey Wong, ed. "Approaches to Exchange Rate Policy. Choices for Developing and Transition Economies," IMF Institute, 1994.
- Bayoumi, Tamin, and Barry Eichengreen, "Shocking Aspects of Monetary Unification", *NBER Working Paper* # 3949, January 1992.
- Begg, David, "Monetary Policy during Transition: Progress and Pitfalls in Central and Eastern Europe," *Oxford Review of Economic Policy*, vol 13, No.2, 1997.
- Begg, David, "Pegging Out: Lessons from the Czech Exchange Rate Crisis," Birkbeck College, London and CEPR, December 1997, mimeo.
- Blanchard, Olivier J. and Danny Quah, "The Dynamic Effects of Aggregate Demand and Supply Disturbances", *American Economic Review*, 1989 September, 655-673.
- Blanchard, O., R. Dornbusch, P. Krugman, R. Layard, and L. Summers, *Reform In Eastern Europe*, The MIT Press, 1991.
- Bofinger, Peter, Heiner Flassbeck and Lutz Hoffmann "Orthodox Money-Based Stabilization (OMBS) versus Heterodox Exchange Rate-Based Stabilization (HERBS): The Case of Russia, The Ukraine and Kazakhstan", *Economic Systems*, Vol. 21, No.1, March 1997.
- Brada Josef C. and Ali M. Kutan, "The Czech Republic," in Desai, Padma, ed. *Going Global. Transition from Plan to Market in the World Economy*, The MIT Press, 1997.
- Brada, Josef C. and Z. Drabek, "The Impact of Exchange Rate Regimes on the Stability of Trade Policy," mimeo 1998.
- Bruinshoofd, Allard, "The Czech Exchange Rate and Economic Fundamental," *Czech National Bank Working Paper*, No. 73, 1997.
- Bruno, Michael, "High Inflation and the Nominal Anchors of an Open Economy," *Essays in International Finance*, No. 183, Princeton University, June 1991.
- Bruno, Michael, "Crisis, Stabilization, and Economic Reform," Clarendon Press, Oxford 1993.
- Buch, Claudia M. and Ralph P. Heinrich, "The End of the Czech Miracle," *Kiel Discussion Papers* 301, June 1997.
- Capek, Ales, "Realny Efektivni Smenny Kurs: Problemy Konstrukce," *Working Paper* No.77, Czech National Bank, 1997.
- Citrin, D. A. and A. K. Lahiri, ed., "Policy Experience and Issues in Baltics, Russia and Other Countries of the Former Soviet Union," *IMF Occasional Paper* 133, Washington, D.C., December 1995.
- Coorey, S., M. Mecagni and E. Offerdal, Disinflation in Transition Economies: The Role of Relative Price Adjustments. *IMF Working Paper*, 96/138, December 1996.
- Dedek, O., Echoing the European Monetary Integration in the Czech Republic, *Czech National Bank, Working Paper* # 80, 1997.
- Dedek, Oldrich, "Horke Penize, Spekulace a Kurzova Politika v Podminkach Ceske Republiky," *Working Paper*, Czech National Bank, 1993, No. 13.
- Dedek, Oldrich, "Monetary Integration Perspectives of the Czech Republic," Summary of the Lecture at the Austrian Central Bank, 1997(b).
- Dornbusch, Rudiger, Inflation, Exchange Rates and Stabilization, *Essays in International Finance* No. 165, Princeton University, International Finance Section, October 1986.
- Dornbusch, R. F. Sturzenegger, and H. Wolf, "Hyperinflations: Sources and Stabilization," *Brookings Papers on Economic Activity*, 2, 1990.
- Edwards, Sebastian, "Exchange Rates as Nominal Anchors," *Weltwirtschaftliches Archiv*, 1993, Band 129, Heft 1, 1-32.
- Eichengreen, Barry, *International Monetary Arrangements for the 21st Century*, The Brookings Institution, D.C. 1994.
- Eichengreen, Barry, Andrew Rose and Charles Wyplosz, "Exchange Market Mayhem: The Antecedents and Aftermath of Speculative Attacks," *Economic Policy*, No. 21 1995, 249-312.

- Fidrmuc, Jan and Julius Horvath, "Stability of Monetary Unions: Lessons from the Break-up of Czechoslovakia," Working Paper, University of Tilburg, CentER, 1998.
- Fischer, Stanley, "Stability and Exchange Rate Systems in a Monetarist Model of the Balance of Payments," in *The Political Economy of Monetary Reform*, ed. By Robert Z. Aliber, Allanheld, Osmun and Co., 1977.
- Fischer, Stanley, "Exchange Rates versus Money Targets in Disinflation," in Stanley Fischer, ed., *Indexing, Inflation, and Economic Policy*, MIT Press, 1986, pp. 247-262.
- Fleming, Marcus J. "On Exchange Rate Unification," *Economic Journal*, Vol. 81, 1971, 467-88.
- Flood, Robert F., "Capital Mobility and the Choice of Exchange Rate System," *International Economic Review*, Vol 20, 1979, 405-16.
- Frenkel, Jacob A., and Joshua Aizenman, "Aspects of the Optimal Management of Exchange Rates," *Journal of International Economics*, Vol 13, 1982.
- Funke, Michael, "The Nature of Shocks in Europe and in Germany," *Economica* 1997, 64, 461-69.
- Grauwe, Paul de and Wim Vanhaverbeke, "Is Europe an Optimum Currency Area? Evidence from Regional Data," Centre for Economic Policy Research, Discussion Paper Series, No. 556, 1991.
- Gutián, Manuel, "The Choice of an Exchange Rate Regime," in Barth and Wong ed. (1994).
- Hajek, M. et al. "Macroeconomic Analyses of the Czech Economy, (in Czech), Czech National Bank, 1997, Working Paper No. 82.
- Halpern, L. and Charles Wyplosz, "Equilibrium Exchange Rate in Transition Economies," *IMF Staff Papers*, Vol. 44, No. 4, December 1997, pp. 430-461.
- Heller, Robert "Determinants of Exchange Rate Practices," *Journal of Money, Credit and Banking*, August 1978, 308-321.
- Hrncir, Miroslav, "Exchange Rate Regimes for the Stages of Transition," Financial Reform in Central and Eastern Europe EC(ACE) Project No. ERB 4012 PL 900 69 Conference; Prague 3-4 September 1993.
- Hrncir, Miroslav, "The Exchange Rate and Transition: The Case of the Former Czechoslovakia," in Herr, Hansjorg, Silke Tober and Andreas Westphal, ed. *Macroeconomic Problems of Transformation. Stabilization Policies and Economic Restructuring*, Edward Elgar 1994. ed. 1994, pp. 228-255.
- Ishiyama, Yoshihide "The Theory of Optimum Currency Areas: A Survey" *Staff Papers International Monetary Fund*, 1975, Vol. 22, pp.344-83.
- Janackova, S., European Union Accession: Selected Topics Relevant for Czech Monetary Policy. Czech National Bank, Working Paper #72, 1997.
- Klaus, Vaclav, "Promoting Financial Stability in the Transition Economies of Central and Eastern Europe," in *Maintaining Financial Stability in a Global Economy. A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, 1997.
- Kaminsky, G.L, S. Lizondo and C.M. Reinhart, "Leading Indicators of Currency Crisis," IMF Working Paper, 97/79, Washington, International Monetary Fund, 1997.
- Krugman, Paul, "A Model of Balance of Payments Crises" *Journal of Money, Credit and Banking*, Vol 11, pp. 311-325, 1979.
- Kenen, Peter, "The Theory of Optimum Currency Areas: An Eclectic view," in Mundel and Swoboda (eds.) *Monetary Problems in the International Economy*, University of Chicago Press, 1969
- Kenen, Peter B. "Analyzing and Managing Exchange-Rate Crises," *Open Economies Review*, 1996, Volume 7, Special Supplemental Issue.
- Lazarova, Stepana and Vladimir Kreidl, "Rovnovazny Menovy Kurz," Working Paper No. 75, Czech National Bank, 1997.
- Lipschitz, Leslie J. "Case Study of Czechoslovakia," in Barth and Wong (1994).
- Masson P.R. and M.P. Taylor (1992), "Common Currency Areas and Currency Unions: An Analysis of the Issues," CEPR Discussion Paper No. 617.
- McKinnon, Ronald I., "Optimum Currency Area," *LIII*, 4, *American Economic Review*, 1963, September, 717-725.
- Milesi-Ferretti, Gian Maria and Assaf Razin, "Persistent Current Account Deficits: a Warning Signal?, *International Journal of Finance and Economics*, Volume 1, Number 3, July 1996, 161-181.
- Minford, Patrick, "Discussion of Bayoumi and Eichengreen," in Torres and Giavazzi, eds. *Adjustment and Growth in the European Monetary Union*, Cambridge, Cambridge University Press, 1993.
- Mitchell, B.R., *International Historical Statistics. Europe 1750-1988*, Third Edition, Stockton Press 1992.

- Mundell, Robert A., "A Theory of Optimum Currency Areas," LI, 4, *American Economic Review*, 1961 657-665.
- Oblath, Gábor, "Exchange Rate Policy and Real Exchange Rate Changes in Economic Transition" in Janos Gacs and Georg Winckler eds. *International Trade and Restructuring in Eastern Europe*, Physica-Verlag, A Springer-Verlag Company 1994.
- Obstfeld, Maurice and Kenneth Rogoff, "The Mirage of Fixed Exchange Rates," Working Paper No. 51191, NBER, July 1995.
- Obstfeld, Maurice and Kenneth Rogoff, 1996, *Foundations of International Macroeconomics*, The MIT Press.
- Polak, Jacques J. "Convertibility: An Indispensable Element in the Transition Process," in Williamson ed. 1991.21-30.
- Poole, William, "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," *Quarterly Journal of Economics*, Vol 84, May 1970.
- Roubini, Nouriel and Paul Wachtel, "Current Account Sustainability in Transition Economies," presented at the Third Dubrovnik Conference on Transition Economies, Dubrovnik, Croatia, June 1997.
- Sachs, Jeffrey D., "Economic Transition and the Exchange-Rate Regime," *American Economic Review*, Papers and Proceedings, May 1996, 147-152.
- Schadler, S. ed., "IMF Conditionality: Experience Under Stand-By and Extended Arrangements. Part II: Background Papers," IMF Occasional Paper 129, Washington, D.C., September 1995.
- Smidkova, K. et. al, "Menova krize koruny v roce 1997," Czech National Bank, 1998, mimeo.
- Smidkova, Katerina, "Estimating the FEER for the Czech Economy," Working Paper No. 87, Czech National Bank, 1998 (b).
- Summers, R. and Heston, A. "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988," *Quarterly Journal of Economics* 106/2, May, 1991, pp. 327-68.
- Tavlas, George S., "The 'New' Theory of Optimum Currency Areas", *The World Economy*, Vol. 16, 1993, 663-685.
- Williamson, John, ed. *Currency Convertibility in Eastern Europe*, Institute for International Economics, Washington, DC. September 1991.
- Czech National Bank Reports, various issues.
- International Monetary Fund, *World Economic Outlook*, 1997 October.
- International Monetary Fund, *World Economic Outlook. Interim Assessment*, December 1997.
- International Monetary Fund, "Czech Republic. Selected Issues." 1998.
- Transition Report 1998. Publication of the Central Bank of Austria.

Appendix A. Chronology of the Czech Currency Crisis in 1997

- February 11. The Czech Koruna reaches its high above the central parity as a result of an increased demand due to large issue of koruna-denominated Eurobonds.
- March 12. Prime Minister Klaus criticizes monetary policy stance as tight.
- March 25. Prime Minister Klaus rules out devaluation.
- April 11. The Czech National Bank announces a reduction of the reserve requirement ratio from 11.5 % to 9.5 %.
- April 17. Government approved a wide-ranging package of stabilization measures and reform which strengthen the koruna. Prime Minister Klaus again urges a loosening of monetary policy.
- May 2. The Czech Statistical Office revises downward its GDP growth projection to 3-3.5% from 4-5 %.
- May 12. The Czech Statistical Office releases 1997 first quarter industrial output data, confirming the slowdown of activity.
- May 14. Koruna at its low, 3.88% in the devaluation band. The Financial Times publishes a negative survey for the Czech Republic. Opinion poll shows Prime Minister's Klaus ruling party popularity at all-time low.
- May 15. The Czech National Bank intervention on the foreign exchange market due to the weakening of the koruna to 5.25% below its central parity.
- May 16. The Czech National Bank raises the repo rate from 12.4 to 12.9 per cent (by 50 basis points). The Lombard rate is also increased from 14 to 50% with restrictions on the access to the Lombard window. Also the Czech National Bank intervention in the foreign exchange market continues.
- May 19. The Czech National Bank sets a maximum rate of 45 percent for its repos, to withdraw liquidity. Koruna strengthens to about 2.8 percent below its central parity.
- May 20. Komerční Banka (the largest Czech commercial bank) increases its prime lending rate to 24.7 percent. Other commercial banks follow. The Czech National Bank limits access to the Lombard window. Overnight interbank rates rises to almost 100 percent.
- May 21. The Czech National Bank injects some liquidity with reverse repos at an average interest rate of 106 percent; koruna strengthens temporarily. The overnight interest rates still close to 100 percent.
- May 22. Koruna comes under renewed pressure, depreciating to 6.2 percent below parity in the morning. The Czech National Bank closes the Lombard facility, raises the one-week repo to 75 percent. Koruna again recovers in the afternoon to 3-4 percents below parity. The overnight interest rates reach approximately 200 percent. Public confidence weakens and residents start to exchange korunas into foreign currencies.
- May 23. The Czech National Bank continues to withdraw liquidity at almost 75 percent with one- and two-week repos. The koruna again strengthens to about one percent below parity.
- May 26. Holidays in the U.S. and in London; the koruna only about 2 percent below parity. The overnight interest rates around 75 per cent. At the evening the Czech National Bank and the government announces that the ± 7.5 percent target band will be replaced by managed floating and that the koruna would be stabilized vis-à-vis DM but without officially binding limits. The discount rate is raised from 10.5 percent to 13 percent and the Lombard rate is at 50%.
- May 27. During the day the koruna depreciates to almost 12 percent below the previous parity. This leads to an increase of the discount rate from 10.5 percent to 13 percent. At closing the koruna strengthens to 10.7 percent below parity. Market is very thin.

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