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Analysis of External Economic Stability of the Czech Republic

Master Thesis

Elaborated by: Martin Kuncl

Mater Thesis Supervisor: Ing. Pavel Žamberský, PhD

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Announcement

I hereby announce that I have elaborated the master thesis on the theme "Analysis of External Economic Stability of the Czech Republic" on my own. All used literature is mentioned in the reference section.

24th April 2008, Prague

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Introduction

Various measures of external economic stability are important indicators of the quality of economic development and are often used to determine the sustainability of country's economic profile. There are various measures of external economic stability and the interpretation of the balance of those indicators among economists has evolved in past and still remains often ambiguous.

The most commonly used indicator is undoubtedly the current account deficit. The theory on this important variable representing the difference between domestic savings and investment recommends various approaches in evaluating the sustainability of current account balance. On the one hand current account deficits often precede important financial crises with profound negative impacts on real economy. Therefore this indicator is used in combination with a series of other indicators to determine the likelihood of an upcoming monetary crisis. And consequently some economists would endorse the recommendation of balanced current account, as the situation where the international investment position does not change, or promote the benchmark value of a maximum deficit of 5% of GDP.

On the other hand many economists argue that in principle the current account deficit is nothing negative as it only allows for intertemporal trade i.e. international participation in productive investment as well as intertemporal consumption smoothing (Obstfeld, Rogof 1996). Moreover based on the latter argument the economists are even puzzled by the fact that current account imbalances are limited in scope (Feldstein-Horioka puzzle). Due to this ambiguity of interpretation of current account imbalances it is important to find other indicators of external economic stability which would incorporate more information than those contained in the current account and allow for determination of external stability.

Indeed, this approach is necessary especially in the case of the Czech Republic and other transforming countries which are in the stage of rapid convergence and which can be characterized by important and pertaining current account deficits. Those countries after the fall of communist regime were severely lacking physical capital while having relatively developed human capital.[1] The highly profitable investment opportunities could be financed either by local savings which would mean an unpopular large drop in consumption levels or

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[1] E.g. Duczynsky 2005

by foreign borrowing and direct foreign investment. The latter solution was realized and, logically, caused deficits of current account. The sustainability of this external imbalance was fragile and for instance in the Czech Republic in 1997 the imbalance turned out to be unsustainable and the country had to face minor financial crisis.

The purpose of this paper is to analyze the external economic stability of the Czech Republic. In the first part of the paper we will present the main indicators of external economic balance and review the most relevant theory. The emphasis will be given to the intertemporal approach to the current account balance. Besides the standard intertemporal model a more advanced relevant amendments to the intertemporal model will be presented. The chapter will be concluded with a review of most relevant indicators for the case of transforming countries like the Czech Republic.

In the second part the simple accounting analysis of various balances of potential indicators of external economic stability in the case of Czech Republic will be carried out. Interrelationships between those indicators would be verified by an econometric analysis of the main determinants of external economic balances. The purpose would be to validate the theoretical assumptions made in the first part of the paper and draw other conclusions and implications for the external economic stability.

1. Definition of external economic stability

External economic stability is usually defined as an exchange of material and other flows between the residents of the country concerned and the residents of the rest of the world which is sustainable in the long term. Sustainability usually means that the situation won't induce any economic disturbances such as the monetary or financial crisis in the future with all possible repercussions on the real economy.

To determine whether an economy is in balance with respect to the rest of the world economists usually start with the study of statistical accounts recording flows such as the balance of payments or stocks e.g. international investment position or indicators of external debt and than construct various ratios which compared to other countries or arbitrary benchmark values are considered to be representative for eventual unsustainability of countries' external economic balance.

1.1.   Balance of payments

Balance of payments is a statistical record of economic transactions between the residents of the reporting country and nonresidents i.e. residents of the rest of the world during a specific period. The balance of payments is based on double-entry bookkeeping and as such is always balanced. When we refer to disequilibrium of the balance of payments we usually mean imbalances of its components. The horizontal components of the balance of payment following the prescriptions of the most recent i.e. the fifth edition of International Monetary fund (IMF) Balance of Payments Manual will be discussed in this chapter. Major components of the balance of payments are the current, capital and financial accounts. Current account records transactions in the real economy specifically the changes of goods, services, incomes and current transfers. The capital account pertains to capital transfers and the acquisition or disposal of non-produced, non-financial assets. The financial account includes changes in external financial assets and liabilities (IMF 1993). Those major components are complemented by the account of net errors and omissions and the change in reserve assets.

If the components are arranged in columns we can imagine drawing a horizontal line according to our consideration under specific components of the balance of payments dividing it into two parts. The part above the line forms a balance that may be in equilibrium or in an disequilibrium (a surplus or deficit). In the latter case the part below the line then finances this

balance. Economists often disagree which balance formed this way is important and describes the best the current condition of the economy vis-à-vis its external economic stability and predicts the eventual economic disturbances. We shall therefore mention now the various used balances and discuss their relevancy in determining external economic stability.

1.1.1. Balance of goods and services

The first balance we can obtain is by drawing a horizontal line just below exports and imports of goods. The interpretation of this so called trade balance in terms of external economic stability is problematic and therefore a more encompassing balance of goods and services is used. This balance also called net exports in national accounting (NX) is a component of gross domestic product (GDP). The following well known identity represents the expenditure approach to GDP formation.

$GDP = C + I + G + NX$, where

GDP........Gross domestic product

C ....Final consumption expenditure of households and NPISH[2]

I...............Gross capital formation

G.............Government final consumption expenditure

NX..........Net exports of goods and services

The balance is usually dependent on the business cycle in the domestic country and in export markets of the economy as well as on the development of terms of trade, which encompasses also the influence of the domestic currency development.

$$TOT = \frac{P_{ex}}{ER \times P_{im}}$$, where

TOT........index of terms of trade

P_{ex}...........index of export prices (in terms of domestic currency)

P_{im}...........index of import prices (in terms of foreign currency)

ER...........nominal exchange rate (in price quotation system[3])

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[2] NPISH – non-profit institutions serving households

Some economists define external economic stability at this balance of goods and services. If a potential deficit is, however, financed by current transfers or a net inflow of income e.g. from the country's positive foreign investment position, this may not necessarily represent a situation of economic instability. Therefore more economic theories work with the balance of the current account.

1.1.2. Current Account Balance

The current account balance consists of the previously presented balance of trade and services, net income and net current transfers. Net income includes the balance of compensation of employees and net investment income.

$CAB = NX + NY + NCT$, where

CAB........current account balance

NY..........net income from abroad

NCT........net current transfers

The current account balance represents the net national saving of residents of the home country and has direct relevance to the determination of the net international investment position of the country[4].

$CAB = S_n - I_n$, where

S_n ....national savings

I_n ....national investment

Because of those important macroeconomic implications the current account is widely used as the indicator of external economic stability by many economists and investors. The approaches to analysis of relevance and interpretation of this balance, however, diverged among economists over last years and to a certain extent even today. Some economists would

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[3] i.e. number of units of domestic currency in terms of foreign currency

[4] Some theories identify the current account balance with the change in international investment position but thus abstract from the valuation changes which are important and represent mainly changes in prices and exchange rates, which are reflected in the international investment position but "balance of payment accounts reflect only transactions". (IMF 1993)

consider a country to be externally stable if its current account is balanced and thus its international investment position remains unchanged (when abstracting from valuation changes). Other approaches are based on arbitrarily developed benchmarks such as the most common which is 5% of GDP. If the current account deficit exceeds this value, then it would be considered as unsustainable or at least alerting.

On the other hand the proponents of the dynamic intertemporal approach to the study of external imbalances argue that "an unbalanced current account is not necessarily a bad thing" (Obstfeld, Rogoff 1996, p.8) because it allows for intertemporal trade and thus enables consumption smoothing by financing productive investment without the need of temporary national drop in consumption levels. It even comes as a surprise to economist that the levels of current account imbalances are so moderated relative to total saving and investment (Obstfeld, Rogoff 2000) especially among developed countries with fully integrated capital markets and thus constitutes the famous Feldstein-Horioka puzzle.[5] Even in this intertemporal approach some measures of sustainability had to be developed e.g. the stable debt-output ratio. This approach will be dealt with more in detail in the following chapter in the theoretical review.

1.1.3. Basic Balance

As was suggested above the current account deficit may not be necessarily negative. Indeed especially in the transition economies with a lack of physical capital a more rapid transformation can be achieved with the wide inflow of foreign direct investment. If invested efficiently the resulting growth may be beneficial for the whole economy even thought its byproduct is a current account deficit (initially caused by import of investment goods and consequently by the outflow of investment income). Therefore we may construct another balance which would incorporate the current account and non-debt capital. Sometimes the balance is constructed as current account and long-term capital. The main idea is that some flows of capital especially the foreign direct investment (FDI) are considered as more stable

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[5] Felsdtein and Horioka (1980) demonstrated that the domestic investment and saving rates were highly correlated even in developed countries, which should mean that the capital mobility among those countries is limited. But this is in contradiction with other available indicators. Many possible explanations have been suggested e.g. see Obstfeld, Rogoff (1996) p. 161 or Obstfeld, Rogoff (2000) p.349.

and less sensitive to various shocks. Moreover in the case of unfavorable development such as major depreciation of the home currency the foreign investors bear the costs and not the home residents contrary to the case of short-term debt instruments, which would obviously aggravate the economic situation of the country even more. This balance is sometimes called the Basic Balance (e.g. Gandolfo 2001) or sometimes Balance of Non-debt Financing of Current Account Balance (Mandel, Tomšík 2003). There is no exactly defined what it encompasses but we will use the following definition:

$BB = CAB + NFDI + PI_e$, where

BB...........basic balance

NFDI.......net foreign direct investment

PI_e ....portfolio investment in equities

In my opinion basic balance is more relevant as the measure of external stability especially in the case of transforming countries. For their transition important investment was necessary to overcome a huge lack of physical capital. One of the way was to receive foreign direct investment that speed up the convergence process, however, also causes important imbalances of current account in the first stage as the result of import of investment goods, in later periods due to outflows of investment income. Some might therefore prefer the transition in which the capital would be accumulated by the economy internally or with the help of debt instruments. But the first would cause slower convergence and the later is associated with risks of ineffective investment and the consequent inability to repay which may cause a crisis if in large scale. In the case of FDI the outflows in terms of investment income must be preceded by creation of profit, which means that the economy is prospering, and the investments in small open economies such as the Czech Republic is often targeted into exporting sectors which would tilt trade balance towards surplus and therefore compensate for the possible deficit of income balance. The sustainability in terms of basic balance in the case of countries in transitions receivers of FDI inflows will be dealt with in detail in the next chapter theoretical review that will deal with the dynamic problems of the determination of external stability at this level as well.

1.1.4. Overall Balance

Overall balance can be created by drawing a horizontal line just above change in reserves and is included here only for the sake of completeness of this review. This basically represents only the changes in the reserves such as those in the case of central bank interventions on the foreign exchange markets. Although it is widely used in some theories such as Johnson or Polak models based on monetary approach to balance of payments (Mandel, Tomšík 2003), in this paper we will focus on the modern intertemporal approach to the balance of payments.

1.2.   Stock indicators

It is also important to take into account stock variables to determine the external economic stability of a country. Because even though the current account deficit is moderate, it cannot be sustainable over long-run because the stock variables in this case international investment position would at a certain moment surpass critical values.

1.2.1. International Investment Position

One of the most important is the international investment position which represents the balance sheet of the stock of external financial assets and liabilities at a certain point of time. On the debit side it comprises all the claims of nonresidents on residents "including the ownership of land and other immovable tangibles located in the domestic country and owned by nonresidents", on the credit side vice versa the claims of residents on nonresidents "including land or other immovable assets located in foreign country and owned by residents" (IMF 1993).

There is a close link between the current account balance and international investment position. As the change of international investment position can be defined by the following identity:

$\Delta IIP = CAB + \Delta V = TB + r \times IIP + \Delta V$, where

IIP ....international investment position

ΔV ....valuation changes

r...............average interest rate on IIP

In contrast to the balance of payments this account reflects not only transactions valued in market prices but also the valuation effect given by the change of prices or exchange rate of the claims included in the account.

The balance of international investment position indicates how much net claims a country has on others or vice vice versa. This net position can be used in the analysis of external economic stability. It determines also the investment income. Although the balance of IIP has direct linkage to the scope of investment income, the differences of returns on assets and liabilities must be taken into account as well.[6]

1.2.2. External Debt

The measurement of foreign indebtedness does not include equity investment categories but rather items of a debt character i.e. liabilities with contracted time of repayment (IMF 1993). For instance gross external debt does not include the balance of foreign direct investment and portfolio investment into equities. When deducting the amount of reserve assets of the central bank from the gross external debt we obtain net external debt.

NED = GED – RA, where

NED ....net external debt

GED ....gross external debt

RA ....reserve assets

The most widely used benchmark values for those indicators are the following. The level of gross external debt shouldn't surpass 40% of GDP, the level of net external debt shouldn't overcome more than twice the level of annual exports. And the level of official reserve assets should cover at least 3 average monthly imports. Those benchmark values are often used as indicators of unsustainable external balance of the country and as predictors of potential monetary crises. We will describe the evolution of above mentioned indicators on the example of the Czech Republic over next chapters.

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[6] For instance U.S. benefit from so called exorbitant privilege paying 3.5% on liabilities and receiving 6.8% on international assets in the period after Bretton-Woods (Gourinchas, Rey 2005).

All the above mentioned stock variables should be reported in current market prices[7] and therefore their value is influenced by exchange rate and price fluctuations.

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[7] IMF BOPM 1993 p. 112

2. Theoretical Review

The purpose of this chapter is not to review all main theoretical approaches to the external imbalances such as the monetary, income or elasticity approaches and mechanisms described by them that automatically tend to adjust those imbalances. In this chapter we would concentrate on the modern intertemporal approach, which allows for dynamic interpretation of imbalances and is conversely to the others more micro-based.

This theory is based on the Fisher intertemporal analysis of consumer behavior and absorption approach with its critique of elasticity approach (Mandel et al. 2003) and extends those preconditions with its microeconomic analysis of consumer behavior optimizing their consumption, saving and investment in a forward looking manner.

To explain in more detail the grounds of the intertemporal approach let me describe briefly the mentioned terms.

2.1.   Elasticity approach

Elasticity approach is very simply an approach to external imbalances under flexible exchange rates regime that is based on the responsiveness of the floating exchange rate to the external imbalances (usually balance of goods and services is used in this model)[8]. The change in exchange rate should be accompanied by the change in quantities of goods demanded in the foreign trade that is in the quantity of net exports of good and services. For instance a deficit of balance of goods and services should cause a depreciation of nominal exchange rate which should cause a raise in exports and fall of imports and consequently reestablish the balance of trade in goods and services. An important precondition for the functioning of this mechanism is the sufficiently high elasticities of supply and demand functions in foreign trade (Marshal-Lerner condition) which may vary over time causing the famous J-curve and may be to low in the case of nominal rigidities in the pricing of exports

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[8] Already this assumption may be considered as unreal especially in short term because the foreign exchange markets are influenced more importantly by speculation forces than flows related to the exchange of goods or services. Therefore also the determination of exchange rate is impossible on the basis of fundamental models especially in the short run (according to some academics less than 36 months, but may have relevance already in over 6 months periods of time (Cheung et al. 2004)).

(imports). Those rigidities have been extensively studied and several typical cases described. Exporters can use Producer Currency Pricing (PCP), Local Currency Pricing (LCP) or even so-called Dolar Pricing. In the case of PCP exchange rate shifts have direct implication on the price and if home and foreign goods are substitutes, there is an expenditure switching effect, which is not present in the case of LCP when the exchange rate does not affect the relative price for importers and consumers.

2.2.   Absorption approach

The absorption approach studies further the effect of exchange rate change on external balances. It is based on the following identity:

$$GDI = GDP + NY + NCT = C + I + G + NX + NY + NCT = A + CAB$$

$$CAB = GDI - A$$

> respectively for the case of the balance of goods and services used usually in the elasticity approach:

$$NX = GDP - A \text{ , where}$$

GDI ....gross domestic income

A ....absorption

It is clear that for a rebalance of CAB resp. NX, there is need to decrease absorption with an unchanged income resp. product or increase income (product) with unchanged absorption or a favorable combination of both. The absorption approach studies various effects that affect the effectiveness of the rebalancing transmission and its proponents argue that the effect of exchange rate change is ambiguous and often does not have real influence on the external imbalances. Gandolfo (2001) and Mandel (2003) mention several conflicting effects. A depreciation in the case of idle resources will lead to an increase in the production but the depreciation related deterioration of terms of trade would limit the increase of the real income (product). Depreciation and linked increase in import and therefore overall prices may also cause through cash-balance effect a "decrease in absorption to enable to restore the real value of cash balances" (Gandolfo 2001, p. 297). On the other hand if depreciation results in higher real income (product) which may raise the domestic absorption. Therefore according to the proponents of absorption approach an exchange rate adjustment cannot result in external balance adjustments.

The most important contribution of this absorption approach to the external balance study is "the idea that the set of macroeconomic factors such as saving and investment decisions" determine the balance (i.e. the current account balance) (Gandolfo 2001).

2.3.   Intertemporal approach

The modern intertemporal approach is based on those assumptions and develops further the microeconomic foundations of the consumer optimization problems. I would like to start by presenting a simple model developed by Obstfeld and Rogoff (1995 or 1996) and then to mention recent adjustments to this model (e.g. Bussière 2004) and finally mention the implications for transforming countries from an stage of development theory (e.g. Mandel et al. 2006).

Obstfeld and Rogoff present a comprehensive guidebook of the intertemporal approach to external imbalances in their publication Foundations of International Macroeconomics (1996). Here at the beginning I would like to present their simple model to demonstrate the main idea of this approach.

The intertemporal approach is based on the relationship between national savings and investment therefore it uses mostly current account as the main variable for assessing external balance. However, the sustainability of current account imbalances is not determined only on the basis of the scope of the current account imbalance but with the consideration to its dynamic development over time. We will present various methods for assessment of sustainability in this intertemporal framework at the end of this chapter.

2.3.1. The standard intertemporal model

Here I would like to briefly outline the main assumptions of the intertemporal model, its development and implications. I will use a simple infinite-horizon model presented in the centerpiece work of modern international economics Obstfeld, Rogoff (1996).

The model assumes a small-open economy with a population normalized to one representative agent who maximizes its time-separable lifetime utility function U over infinite period of time[9] with perfect foresight.

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} u(C_s), \text{ where}$$

Ut ....total utility of the representative agent

β ....subjective discount or time preference factor (denoting individual impatience to consume), which is $0 < \beta < 1$

Cs ....consumption at time s

u(.) ....utility function where $u'(C_i) > 0$ and $u''(C_i) < 0$ (strictly increasing and strictly concave)

We can define as previously the current account balance as

$$CAB_t = NFA_{t+1} - NFA_t = Y_t - r \cdot NFA_t - C_t - G_t - I_t, \text{ where} \tag{1}$$

NFAt ......value of net foreign assets at the end of period t

r ....interest rate for borrowing and lending on world capital markets

$$I_t = K_{t+1} - K_t$$

K$_{t+1}$ ....stock of capita at the end of period t (accumulated through the period t by It)

The production function is $Y = A \cdot F(K)$ where $F'(K) > 0$, $F''(K) < 0$ and F(0) = 0 i.e. the production function is strictly increasing in capital, which is the only production factor but is subject to diminishing marginal productivity and without any capital the production would be zero. And A is exogenously varying productivity coefficient.

After substituting into the utility function the representative individual then maximizes the following utility:

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[9] The assumption of an individual living infinitely may seem to be too unrealistic, but the idea can be supported by two arguments. Firstly, the individuals are not sure about their length of life and secondly if they care about their descendants, it may be considered as optimizing over infinite period of time (Obstfeld, Rogoff 1996).

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} u\left[(1+r)NFA_s - NFA_{s+1} + A_s F(K_s) - (K_{s+1} - K_s) - G_s\right]$$

The first-order conditions for this optimization problem with respect to NFA_{t+1} and K_{s+1} are the following.

The intertemporal Euler equation:

$$u'(C_s) = (1+r)\beta u'(C_{s+1})$$

This equation simply means that in optimum the utility from one additional unit in period s is equal to the utility of one additional unit in period s+1 so there is no incentive to tilt consumption from one period to another further. In other words if you save one unit with marginal utility $u'(C_s)$ in period s, you can obtain (1+r) units next period which would have the utility (discounted by subjective intertemporal factor β[10]) $(1+r)\beta u'(C_{s+1})$.

$$u'(C_s) = \frac{dU_{s+1}}{dC_s} = U'(C_{s+1})\frac{dC_{s+1}}{dC_s} = \beta u'(C_{s+1})\frac{dC_{s+1}}{dC_s} = \beta u'(C_{s+1})(1+r)$$

The second first-order condition represents the fact that the marginal product of using additional capital must be equal to the marginal costs that are represented by the world interest rate (which is in the case of a small open economy considered as exogenous):

$$A_{s+1}F'(K_{s+1}) = r$$

This also implies that the capital stock is not dependent on the consumption (saving) decisions of the representative individual but solely on the cost of capital i.e the world interest rate. As we assume perfect capital mobility profitable investment opportunities can be financed with capital from abroad. (In the case of small economy the saving-consumption decisions will neither affect the magnitude of world interest rate.)

By rearranging equation (1) we can obtain

$$(1+r)NFA_t = C_t + G_t + I_t - Y_t + NFA_{t+1}$$

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[10] β is the intertemporal subjective discount factor that can be defined as well as $\beta=1/(1+\delta)$, where δ is the subjective time preference rate. If $\beta=1/(1+r)$ resp. $r=\delta$ than $C_s=C_{s+1}$ i.e. the consumption will be smoothed over those periods.

Next by forwarding this identity forward, iterating and substituting, we can obtain the following identity:

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(C_s+I_s)+\lim_{T\to\infty}\left(\frac{1}{1+r}\right)^{T}NFA_{t+T+1}=(1+r)NFA_t+\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(Y_s-G_s)$$

But it is necessary to rule out all "Ponzi schemes" i.e. it shouldn't be possible to roll on debts indefinitely. Therefore we impose so-called transversality condition:

$$\lim_{T\to\infty}\left(\frac{1}{1+r}\right)^{T}NFA_{t+T+1}=0$$

The budget constraint then becomes as follows:

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(C_s+I_s)=(1+r)NFA_t+\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(Y_s-G_s) \tag{2}$$

The value of net present value of consumption and investment expenditures is limited by the net present value of future output and net foreign assets.

If we rearange equation (2) in an infinite horizon and assume a special case in which $\beta=1/(1+r)$, i.e. the consumption is constant over time, we obtain the following:

$$C_t=\frac{r}{1+r}\left[(1+r)NFA_t+\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(Y_s-G_s-I_s)\right] \tag{3}$$

the consumption therefore is defined as "the annuity value of total discounted value of net foreign assets and discounted future income net of government spending and investment, which is related to the permanent income hypothesis." (Obstfeld, Rogoff 1996)

When combining the equation (3) and (1) we obtain:

$$CA_t=NFA_{t+1}-NFA_t=(Y_t-\tilde{Y}_t)-(I_t-\tilde{I}_t)-(G_t-\tilde{G}_t) \text{, where} \tag{4}$$

$$\tilde{X}_t=\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}X_s \text{ is the permanent value of variable X.}$$

This is a very important outcome and the centerpiece of intertemporal approach. The proponents of this theory strictly differentiate between the permanent and temporary changes of determinants of current account. Thus a temporary high output over the permanent level,

temporary low investment or temporary low government expenditure contribute to higher current account surplus because the representative agent trying to smooth consumption over time will distribute the temporarily high resources available for consumption over all periods of time and therefore shift some of the resources via current account surplus to future periods. On the other hand changes in permanent output, investment or government expenditure won't affect the current account balance as the representative individual would have no incentive to tilt resources over periods. The intertemporal smoothing of consumption with the help of current account imbalances would be possible in the case of country-specific shocks. Conversely, the global shocks would only change the world interest rate and not inter-country current account imbalances. The equation (4) is relevant for perfect foresight as well as for unexpected changes.

2.3.2. Relevant amendment to the basic intertemporal model

Many studies and empirical verifications of intertemporal models have been carried out and some important facts were discovered that are missing in the simple representative individual simple model presented above. In the next section it will be demonstrated on empirical tests that some of those implications are relevant for the case of the Czech Republic as well. This part and intertemporal model adjustments briefly explained here is based on the work of Bussière et al. (2004), which was later used in other papers such as Zanghieri (2004).

According to Bussière et al. (2004) there are two main important features discovered in empirical studies that can be successfully incorporated into a more advanced intertemporal model. First of those two important findings is the fact that current account balances in many empirical studies show a high persistence i.e. in the empirical analysis current account balance is highly determined by its lagged value.

Second of those findings is the fact that according to empirical studies the fiscal balance have significant influence on the current account. However, in the simple intertemporal model Ricardian equivalence of debt and taxes should hold. Therefore for given government spending the changes of taxes, assumed here to be lump-sum and therefore not distorting, and linked change in government balance should have no effect on total saving or investment and therefore on current account balance.

To demonstrate why in the standard intertemporal model consumption is neutral to government balances caused by change in taxes we will start by deriving intertemporal

budgets constraints for both private sector and government. By transforming equation (1) from the standard intertemporal model we may obtain current account identity for private sector:

$$NFA_{t+1}^{p} - NFA_{t}^{P} = Y_t + r_t \cdot B_t^{P} - T_t - C_t - I_t,$$

where we used instead of NFAt net private assets NFA_t^p and instead of government spending taxes, which are assumed to be lump-sum and therefore not distorting.

The budget constraint in equation (2) can be then rewritten for the case of private sector in the following:

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(C_s + I_s) = (1+r)NFA_t^{P} + \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(Y_s - T_s) \qquad (5)$$

The same may be applied in the case of government to obtain:

$$NFA_{t+1}^{G} - NFA_{t}^{G} = T_t + r_t \cdot B_t^{G} - G_t$$

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t} G_s = (1+r)NFA_t^{G} + \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t} T_s \qquad (6)$$

When combining both intertemporal budget constraints as $NFA = NFA^P + NFA^G$ we obtain again the equation (2) from the standard intertemporal model:

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(C_s + I_s) = (1+r)NFA_t + \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(Y_s - G_s) \qquad (7)$$

This outcome confirms the theoretical validity of Ricardian equivalence of debt and taxes. As long as the present value of government spending is equal to the net present value of future government incomes and present government wealth, the private sector choices are independent to change in taxes, which are not present in the equation (7) at all.

Of course the Ricardian equivalence fails if the assumptions are relaxed and for instance private sector cannot borrow at the same interest rate as government or if the taxes are distortling or in the case of some adjustments to the model such as the overlapping generations model (Obstefeld, Rogoff 1996).

Bussière (2004) proposes other adjustments to the model that would support the two mentioned findings, current account persistence and fiscal balance relevance. He abandons the

representative individual assumption and characterizes instead two types of agents. First is liquidity constrained and therefore is not optimizing in any way including Ricardian but consumes all its disposable income: $C_t^{NR} = Y_t - I_t - T_t$. The second type of agents is optimizing in Ricardian way but its utility function is based on the external habit formation assumption i.e "we assume that the intra-period utility does not depend on the actual consumption but rather on its overlap over a certain amount γ of last period consumption" (Bussière et al. 2004).

The optimization of consumption decisions are then the following:

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} u(C_s^R - \gamma \overline{C_{s-1}}) \text{, where}$$

γ ....degree of habit persistence (0< γ<1)

$\overline{C_s} = \lambda C_t^{NR} + (1-\lambda)C_t^R$ is the aggregate consumption of the population (normalized to one) composed of Ricardian and non-Ricardian individuals.

After similar iteration of a budget static budget constraint of an optimizing Ricardian individual and ruling out Ponzi schemes we obtain the following intertemporal budget constraint for private sector (an intertemporal budget constraint for government will be derived later on), which is similar to equation (5):

$$\sum_{s=t}^{\infty} \left(\frac{1}{1+r}\right)^{s-t} (C_s^R + I_s) = (1+r)NFA_t^p + \sum_{s=t}^{\infty} \left(\frac{1}{1+r}\right)^{s-t} (Y_s - T_s)$$

First order condition for optimization problem is again intertemporal Euler equation in the following form:

$$u'(C_s^R - \gamma \overline{C}_{s-1}) = (1+r)\beta u'(C_{s+1}^R - \gamma \overline{C}_s)$$

In the case of β=1/(1+r) the consumption function can be derived after several steps to :

$$C_t^R = \frac{\lambda}{1+r} \overline{C}_{t-1} + \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) rNFA_t^P + \left(1 - \frac{\gamma}{1+r}\right) \frac{r}{1+r} \sum_{s=t}^{\infty} \left(\frac{1}{1+r}\right)^{s-t} (Y_s - T_s - I_s)$$

The government intertemporal budeget constraint is derived similarly to the case above we obtain equation (6):

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}G_s = (1+r)NFA_t^G + \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}T_s$$

The stock of net foreign assets are, however, defined now differently, because non-Ricardian individuals have no savings neither debts therefore have no outstanding balances of assets:

$$NFA_t = (1-\lambda)NFA_t^P + NFA_t^G$$

After several several manipulations, which I don't want to make full account of as it is not the main purpose of this paper we can derive a dynamic model of current account (for detailed information see Bussière et al. 2004).

$$CA_t = (1-\lambda)\gamma CA_{t-1} + \lambda(T_t + rB_t^G - G_t) + \frac{\gamma(1-\lambda)}{1+r}\Delta NO_t + (+-\lambda)\left(1-\frac{\gamma}{1+r}\right)(NO_t - N\tilde{O}_t) \qquad ,$$

where

NO net output $NO_t = Y_t - I_t - G_t$

In the standard intertemporal model we derived equation (4) which is a special case of this model too where $\gamma = 0$ and $\lambda=0$. In comparison to (4) this equation has other terms that are relevant if γ and λ are different from zero.

The external habits formation causes current account dependence on its lag value. The scope of influence is dependent on percentage of Ricardian individuals in the population and on the degree of habit persistence (Bussière et al. 2004).

The influence of government balance on current account is determined by the percentage of non-Racardian individuals in the population. Given the liquidity constraints of those individuals a more tight fiscal policy would lower their disposable income as well as consumption. This model thus gives an insight in the issue of twin-deficits (Bussière et al. 2004).

I personally don't think that Bussière's model is the only possible explanation of the two mentioned findings. I think for instance that if the government balance is important in the determination of the current account it can be not due to variations in taxes but rather temporary variations in government spending that would be in line with the simple model as well. Moreover the Ricardian equivalence fails in many other models as well if some of the

often unrealistic assumptions are relaxed for instance in the overlapping generation model which in this case accounts for finite life-span of multiple overlapping generations.

However, the reason why I mentioned this particular model is the fact that my own empirical tests presented in the following chapters support its idea and because I find the assumptions of habit persistence and liquidity constraints more realistic than is the case of standard intertemporal model.

2.3.3. The sustainability of external imbalances

In this subchapter I would like to deal more about the implication of intertemporal models for external economic stability. From the simple intertemporal model it becomes clear that the current account imbalances are not necessarily harmful. They enable intertemporal trade by allowing for consumption smoothing and at the same time not leaving the profitable investment opportunities idle. Under the assumptions of perfect capital mobility the stock of capital and the scope of investment in a small open economy is independent on the consumption choices of the representative individuals and only depend on the profitability of investment and the cost of capital represented by the exogenous world interest rate.

Therefore under perfect capital mobility which is supposed to be close to reality nowadays especially in the case of developed countries the investment and saving should be able to diverge even in the long periods. However, when Feldstein and Horioka performed a simple test on the level of divergence of those variables, a regression of the investment rate on the rate of savings, the resulting coefficient (β) was surprisingly high, close to one, which is in contradiction with the observed level of capital mobility according to other indicators.

$$I / Y = \alpha + \beta S / Y + e$$

Even though the value of β coefficient in this simple regression is diminishing over time, its value is still higher than the level of financial market integration might suggest. Many possible explanations have been suggested e.g. see Obstfeld, Rogoff (1996) p. 161-163 or Obstfeld, Rogoff (2000) p.349.

Despite the fact that even important current accounts deficits over longer periods of time are not necessarily a symptom of an approaching monetary crises, some limitation from the dynamic point of view have to be imposed as there is not possible for an economy to

indebt itself eternally. The creditors must have some kind of trust in the country's solvency, otherwise they would stop lending.

2.3.3.1. Basic criteria

Several approaches to the dynamic determination of sustainability within intertemporal models have been developed.

A theoretical criterion can be derived from the budget constraint represented by the equation (2) for assessment of a country's solvency resp. its sustainability of external imbalances. Indeed, by rearranging the equation (2) we can obtain the following:

$$-(1+r)NFA_t = \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}(Y_s - C_s - I_s - G_s) = \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t} TB$$

This states that the present value of future unused resources, and therefore available for repayment of foreign debt (more precisely foreign claims), is equal to the value of initial claims nonresidents have on the home economy. A country could run high deficits as long as it will generate surpluses in the future.

In practice, however, it would be difficult to assess solvency on this criteria as the perfect foresight assumption and infinite-horizon optimization might be impractical for lenders. Therefore more realistic criteria have been developed such as the constant ratio of foreign debt to GDP. If a country GDP is growing at a rate g, than net foreign assets can grow at the same rate. From the current account identity (1) we may derive the following:

$NFA_{s+1} - NFA_s = g \cdot NFA_s = r \cdot NFA_s + TB_s$ and when normalized by GDP

$$\frac{TB_s}{Y_s} = \frac{-(r-g)NFA_s}{Y_s}$$

Therefore to maintain the same ratio of debt to product, the trade balance surplus have to cover the possible excess of interest rate over rate of economic growth (Obstfeld, Rogoff 1996).

2.3.3.2. Structural criteria

Besides economic growth some authors suggest other qualitative and structural criteria such as the willingness to repay the debt and the willingness to lend that both might be limited (Milesi-Feretti 1996).

Among the most important structural criteria and characteristics of macroeconomic policies influencing the external economic stability belong the following (Milessi-Feretti et al. 1996):

- Investment rate – high investment rate and high saving rate increase the probability of future growth and potential to repay the debt)

- Openness – a country with large exports can repay debt usually more easily, moreover a possible default "causing trade disruption would be more costly" (Milessi-Feretti et al. 1996)

- Composition of external liabilities – we have to distinguish between debt and equity financing of current account imbalance. We will deal with this distinction more in detail.

- Exchange rate policy – countries with fixed exchange regimes are more prone to monetary crises as experience shows; on the other hand an over-appreciation without the fundamental support of productivity growth might be dangerous as well because it undermines the competitiveness of country's exports.

- Fiscal policy – as we have demonstrated in the previous chapter the Ricardian equivalence does not need to hold and as we will show in the next chapter it does not hold in the case of the Czech Republic either. Therefore we face the problem of twin deficits. An expansive fiscal policy can therefore undermine external economic stability as well.

- Trade policy – a protectionist policy may limit the openness and therefore the ability to repay debt.

- Capital market policy – liberalization of movement on financial account may cause lower instability. Capital market liberalization is often a good predictor of crises. The same happened in the Czech Republic after the liberalization in 1995 (see next chapter for more details). On the other hand such liberalization may be considered by foreign

investors as a "commitment to pursue sustainable policies and therefore increase the perceived creditworthiness of this country" (Milessi-Feretti et al. 1996).

In the case of the Czech Republic a country with relatively high foreign direct investment consideration regarding to the structure of the liabilities is necessary. The transformation of the Czech Republic and other transforming countries of Central and Eastern Europe would be difficult without the inflow of foreign capital. The financing thought internal accumulation of capital would be very long and financing through credit channels may have been risky. The financing through long-term equity capital is more stable and eventual problems are transferred to foreign investors. Therefore an indicator of external stability on level of basic balance as defined in the last chapter might be considered.

However, an equilibrium defined on this balance might not be sustainable in the long run as an inflow of FDI creates an important deficit of international investment position and gradually worsens the income balance when foreign investors start recuperating dividends from their profitable investments. Of course the recuperation of dividends is generally possible only when the investment is profitable but still over time the income deficits may grow to an extent that may threaten the external stability.

We cannot therefore define external stability on the level of basic balance without taking into account the dynamic development.

2.3.3.3.   Life cycle model of transitory economy

Mandel and Tomšík (2006) have developed a model of a life cycle of a transition economy financing its development through FDI and enumerate a number of potential risks at each stage. This model addresses the dynamic problems of external stability defined on basic balance. Therefore I would like to describe the basis of this model and concentrate on the risks linked to the actual stage of transition of the Czech Republic which I would like to deal with in the empirical part of this paper.

The authors in a parallel to the life-cycle model of Moldigliani (1955, 1968) define several stages of a transition economy from young transition economy through mature transition economy to post-transition and finally expanding developed economy. Let me go briefly through characteristics of those.

Young transition economy is characterized by low output and lack of capital. For its development a lot of investments have to be realized. Domestic accumulation of capital with lowering of consumption would be slow and unpopular therefore import of foreign capital is often used to invigorate the economy. The inflow of foreign capital is often linked with inflow of investment goods therefore both balance of good and services as well as current account balance tend to be in deficit. In this case basic balance can be regarded as a criterion of stability. Two main risks are present at this stage: "high interest rates together with fixed exchange rate and capital market liberalization as in the Czech Republic before 1997 can lead to an inflow of debt capital which may be invested unproductively by residents of the country or an over-optimism causing a boom of consumption and consequently unsustainable deficits of balance of goods and services" (Mandel et al. 2006).

Mature transition economy has balanced imports and exports of goods and services but increasing income imbalance. This is the case of the Czech Republic in present. The income outflow is partially reinvested in the country but then the dividends tend to prevail. External stability may be still defined at the basic balance but there are again some risks involved: "the production growth resulting from FDI is consumed in the economy and does not increase exports, exports are highly dependent on imported goods and services or the ratio of reinvested income declines rapidly. Those negative aspects may result in depreciation of the currency and higher inflation" (Mandel et al. 2006).

Post-transitive economy has balanced inflow and outflow of foreign direct investment and the deficit of income balance have to be financed through balance of goods and services surplus. The external stability can be defined on the level of current account balance. The risks might be linked to the limits to export growth.

An economy can then pass to the stage of **expanding economy** with net outflow of capitals and rebalancing or surplus of income balance or consequently to the **balanced developed economy** with all balances level.

We will use the theory outlined in this chapter for the interpretation of external economic stability of the Czech Republic in the following part of this paper.

3. External Economic Balance in the Czech Republic

3.1.   Description and analysis of balance of payment accounts

In this chapter we will go through the above introduced different potential indicators of external economic disequilibrium in order to characterize the overall situation in the Czech Republic in terms of external economic stability. Because of the limited availability of data used in this analysis we shall focus mainly on the time period from 1995 to 2007.

This period of twelve years was characterized by the continuous transformation of the Czech economy. After the seemingly successful initial stage of transformation at the beginning of nineties, when economy registered relatively high growth of product, the country experienced a monetary crisis in 1997 and a consequential recession from 1997 to 1999. This recession was caused by tight monetary policy following the monetary crisis and necessary restructuring which was delayed by the character of privatization at the beginning of nineties and the so called system of "bank socialism" (Helísek 2004). The recession was followed by rather successful period of economic growth that accelerated especially in the last three years. Several factors contributed to this development especially the important inflow of foreign direct investment, privatization and restructuring of banking system and probably relative improvement in the quality of institutions linked to the adoption of the acquis communautaire and the whole process of entrance into the European Union as well; even though the quality of institutions still remains an important issue (Spěváček et al. 2006).

In this period the shape of external economic balance evolved dramatically. Its quality at the beginning of the observed period at the onset of the monetary crisis was different from the one we experience currently after the major inflow of foreign direct investment. And each shape of external position bears its own specific risks that will be addressed here.

Firstly, we will go through all the above defined balances in the balance of payments as well as the stock indicators and the related ratios. At the end we will sum up the relevancy of those indicators in the Czech Republic and try to asses on the basis of this accounting analysis the current shape of external balance and the potential threats for the future.
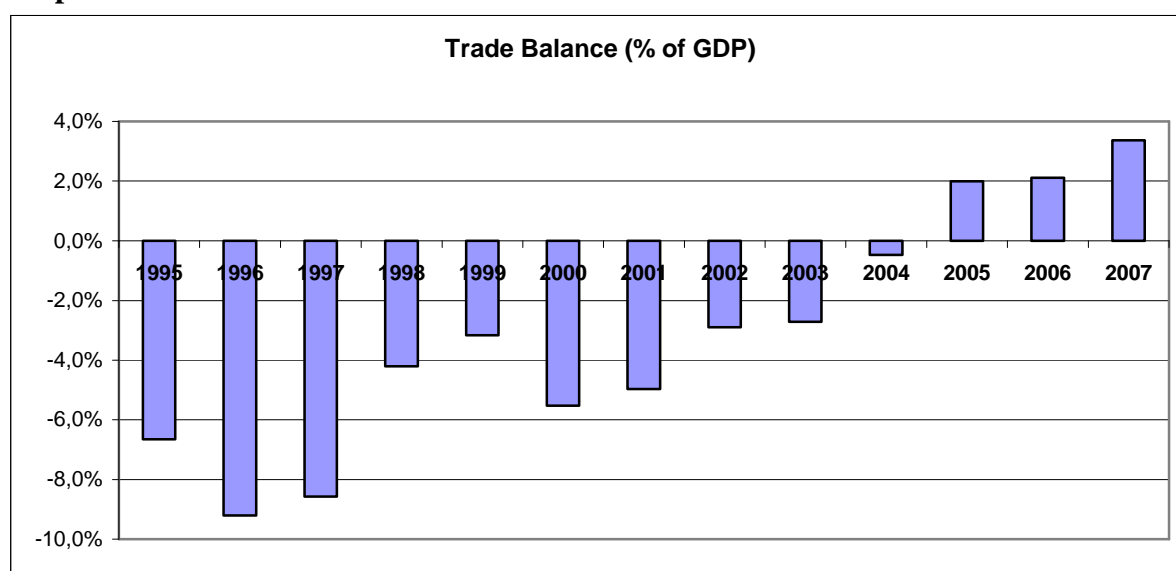
3.1.1. Trade balance

As we have demonstrated in the introductory chapters trade balance is dependent highly on economic growth in both home and foreign counties (outlets for domestic exports) and on the evolution of import and export prices as well as nominal exchange rate i.e. the variables summed up in the terms of trade indicator.

In the Czech Republic the trade balance has recorded substantial changes over the observed period. At the beginning of the transformation it ran important deficits. Those deficits have grown from 1993 to 1996 as a result of growing economy and a high demand for imported consumer goods (unavailable before the transformation). Given the high inflation differential relative to EU countries (Mandel et al. 2003) and the fixed exchange rate the real exchange rate appreciated significantly. The resulting loss of price competitiveness led to stagnation of exports that even decreased measured in percentage of GDP in 1996. Moreover in October 1995 the flow of capital was liberalized allowing important inflows of foreign capital which was attracted by high interest differentials and a policy of fixed nominal exchange rate. The Czech National Bank intervened against the appreciation of the exchange rate and sterilized those interventions, however, not completely because such a policy was clearly costly (see Mandel et al. 2003 for more detailed desription).

The resulting increase in monetary base and increase in the emitted domestic credit in a system where the corporations were linked to banks – system of "bank socialism" (Helísek 2002) – resulted among others in an increase in imports. The resulting trade deficit in 1996 reached record level of 9,2% of GDP. This trend continued until May 1997 when the monetary distress and linked depreciation of the nominal exchange rate, the declining domestic demand linked to the incipient recession and restrictive fiscal policy led to the reverse in this trend and consequently the Czech Republic recorded extremely low deficits of trade balance in 1998 and 1999. In 1998 an extremely positive evolution of terms of trade (an increase of 7,2%) contributed to the low deficit. With the recovery of domestic economy in 2000 the trade balance deteriorated again despite high growth in exports caused by a strong economic performance of major export markets of the Czech Republic (mainly Germany). This result was also linked to the rising prices of energy raw materials (CNB 2000) and resulting deterioration of terms of trade by 5%. In the following three years thanks to among others favorable development of terms of trade and increasing production capacity especially in foreign controlled companies the trade deficit steadily narrowed over the next three years

despite continuous recession on important export markets such as Germany. An economic recovery in the export markets from 2004 together with export promoting effects of realized foreign direct investment supported the continuation of the trend towards the surplus of the trade balance. In 2005 the deficit reversed in trade surplus which continues to widen.
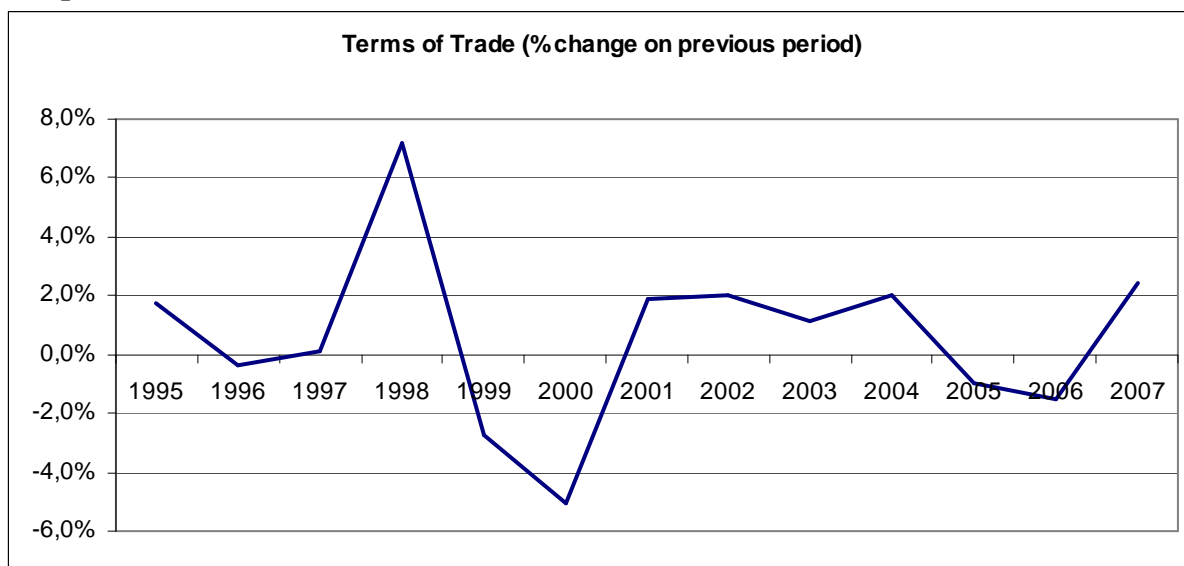
Graph no. 3.1

Source: Czech National Bank

As we have already mentioned the **terms of trade** influence importantly the trade balance when measured in current prices. Variations of terms of trade depend on import and export prices and the evolution of nominal exchange rate. In the Czech Republic they are influenced most importantly by the import prices of energetic raw material – fuels, which caused an important drop e.g. in years 2000, 2005 and 2006. On the positive side they are influenced by the appreciation of domestic currency especially in years 2000 to 2002 and from 2005 to 2007. Their evolution is shown on the following graph.

The evolution of **nominal exchange rate** is also an important factor potentially influencing the trade as well as service balance. The exchange rate is sometimes treated more in detail in terms of external economic balance. And indeed in the case of substantial imbalance a resulting monetary crisis is characterized by the depreciation of nominal exchange rate. Appreciation of **real exchange rate** if not supported by increase in productivity is on the other hand considered as an indicator of approaching threat of monetary crisis. Nevertheless, in the intertemporal approach on which this paper is based does not deal with the assessment of exchange rates to much in detail, therefore I will mention it mainly in

this chapter as a potential determinant of trade and service balance. Moreover the empirical analysis on time series for the period from 2000 to 2007 does not prove the significance of real effective exchange rate at all.

The evolution of nominal exchange rate is shown in the graph no. 3.3. The nominal exchange rate was fixed until 2007 to DEM and USD with assigned weights (75% resp. 25%) and fluctuation band of 0,5% later from 1996 of 7,5%. After the crisis the exchange rate depreciated and started appreciating from 2000 and continued to do so over the rest of observed period with the exception of years 2003 and 2004. The reason for appreciation is given relatively low inflation differential is explained usually by well known Balassa – Samuelson model related to increase of productivity in the sector of traded goods.

Graph no. 3.2

Source: Czech National Bank – ARAD

Graph no. 3.3

Nominal exchage rate CZK/Euro (ECU)
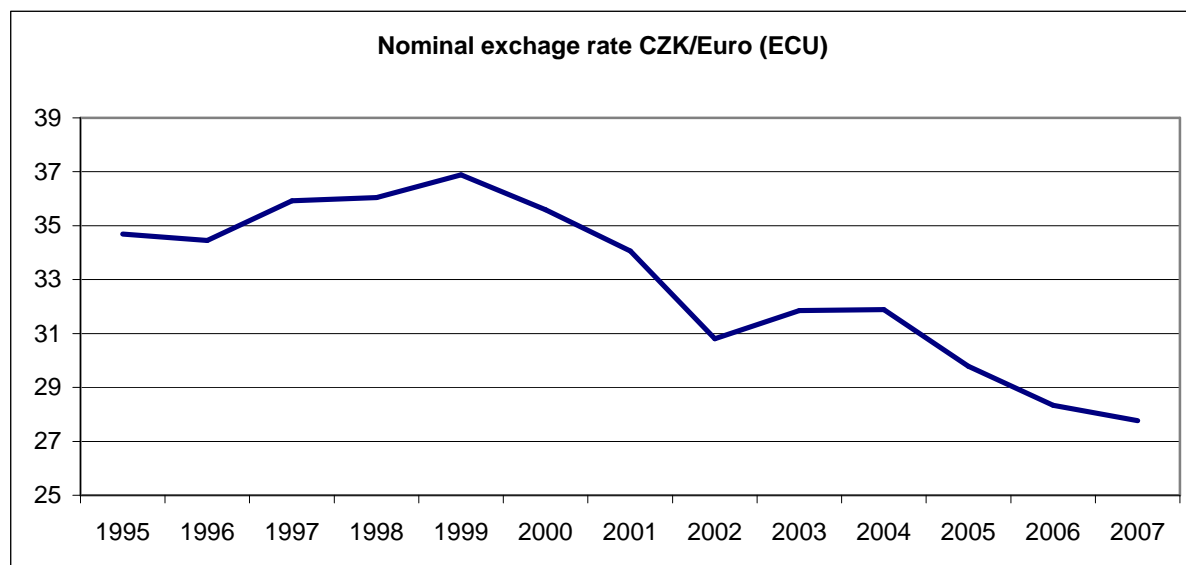
Source: Eurostat

The price competitiveness of domestic products is also influenced by the real exchange rate and the economic growth in home and export countries depicted on the following graphs. The trade balance improves despite a relatively high appreciation of real exchange rate which would confirm that the appreciation is not threatening to the external economic stability.

Graph no. 3.4

Nominal and real effective exchange rates (1999=100)

Source: Eurostat

Graph no. 3.5

Real GDP growth

Source: Eurostat

Graph no. 3.6

Exports and imports of goods (%of GDP)
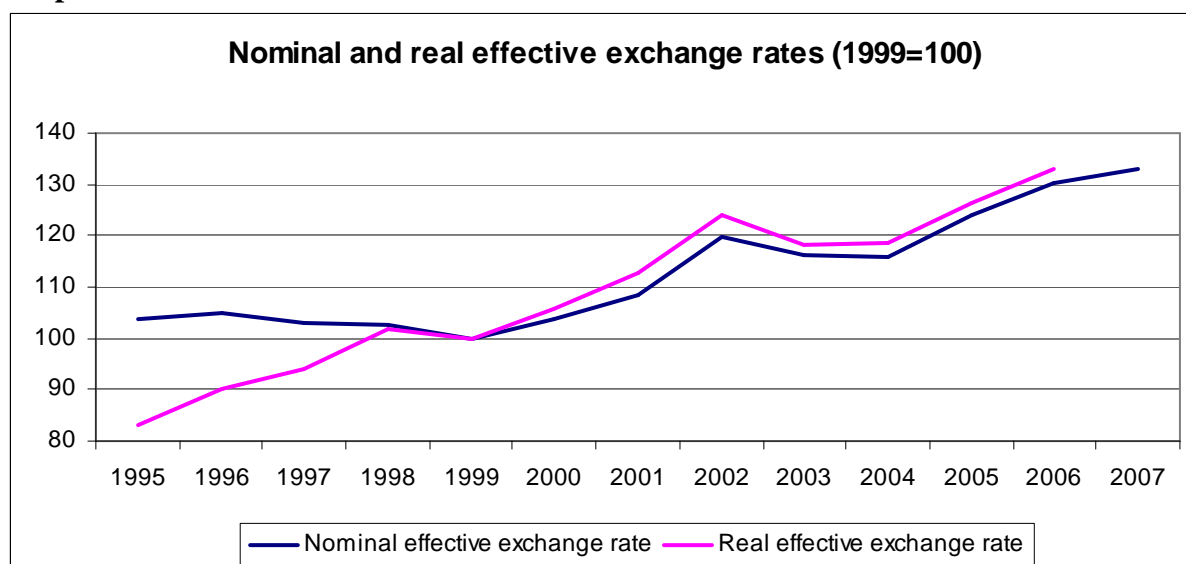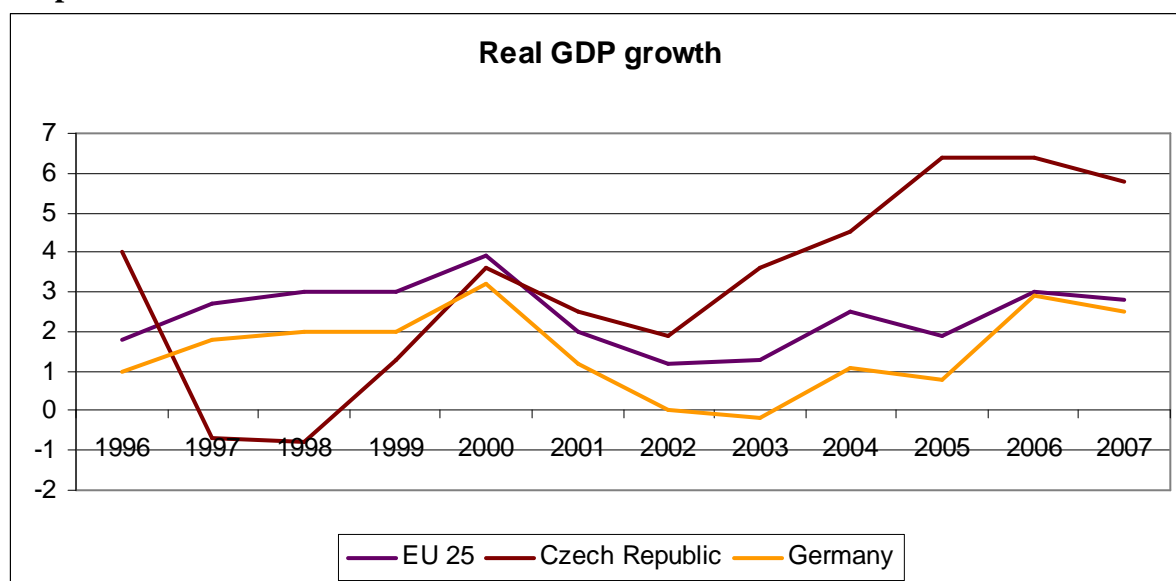
Source: Czech National Bank

3.1.2. Balance of goods and services

The balance of goods and services consists of the already discussed trade balance and the balance of services.

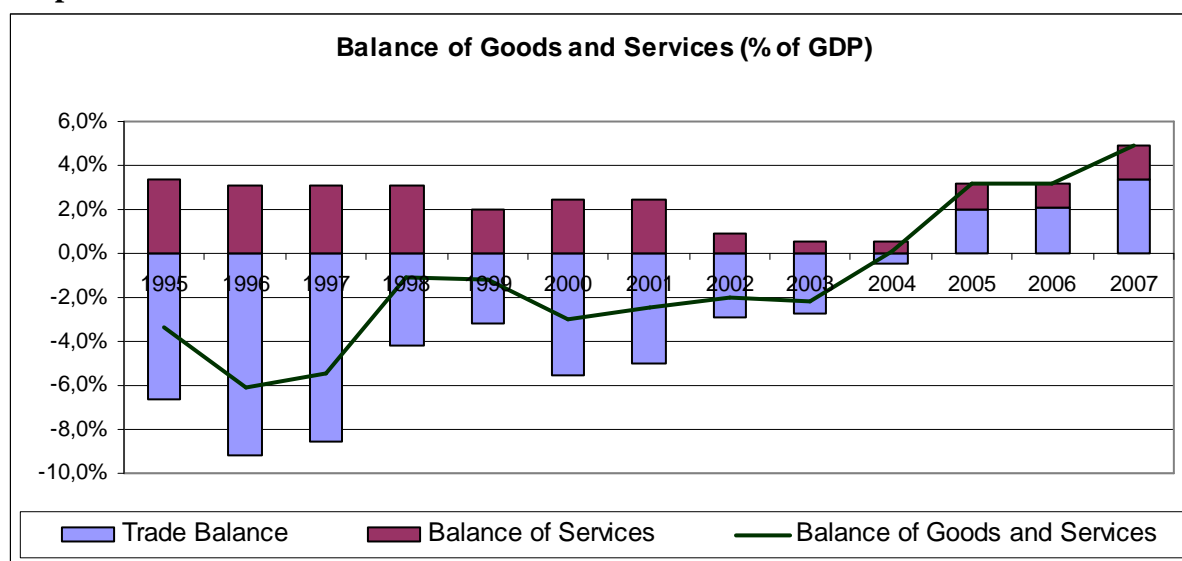**Graph no. 3.7**

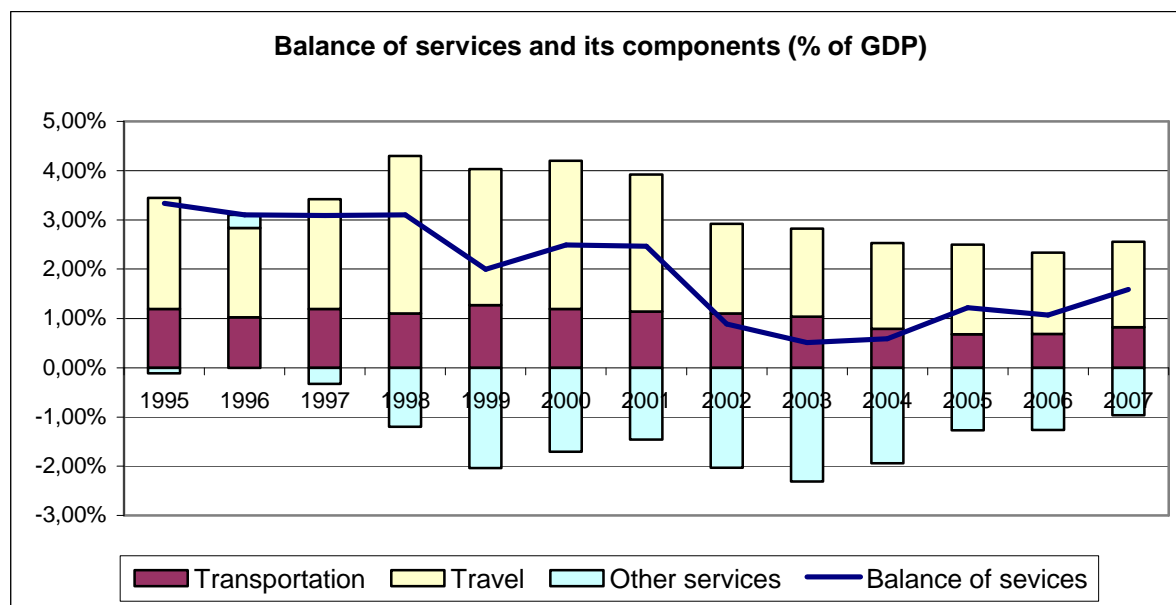**Balance of Goods and Services (% of GDP)**

Source: Czech National Bank

The "invisible trade" or the trade in services was in the case of the Czech Republic in surplus over the whole observed period, but this surplus since 1999 and especially from 2002 importantly decreased and never regained its level of 3% of GDP ever since (see the graph 3.8).

Balance of tourism and travel services was in surplus over the whole observed period, however, a large drop in travel services was caused in 2002 by major floods that affected also Prague i.e. the place most visited by foreign residents (CNB 2002). The lower surplus of travel services in later years is caused among others also by the appreciating domestic currency and a growth of travel services demanded by Czech residents abroad.

The category of other services recorded deficits almost over the whole period. This fact is related to the demand of especially foreign owned companies in the Czech Republic for services provided by their traditional suppliers from abroad. This balance registered the highest deficit in 1999 and 2003 but over the last four years it is ameliorating as the debit side is stagnating and credit side is moderately increasing. This may be due to the fact that foreign investors found on the domestic market equal substitutes of services demanded previously from abroad.

Graph no. 3.8

Source: Czech National Bank

3.1.3. Current Account balance

The current account balance consists of the balance of goods and services, income balance and current transfer balance.

The whole balance in the case of the Czech Republic was over the whole observed period in deficit with important variations. Moreover the structure of the current account balance changed radically. The highest deficits were recorded before the monetary crisis in 1996 (-6,6% of GDP) when the deficit was caused by extremely high trade deficit. With the economic slowdown of 1998-99 the deficit was reduced, however, after the recovery it again raised to the levels of 5 to 6 %. From 2002 the most important component of current account balance became income deficit that increased over time due to previously realized foreign direct investment. In the last three years the current account deficits were again reduced to about 3% of GDP with the widening surplus of trade balance. However, the current account balance still stays in deficit due to continuous increase in income deficit.

Graph no. 3.9
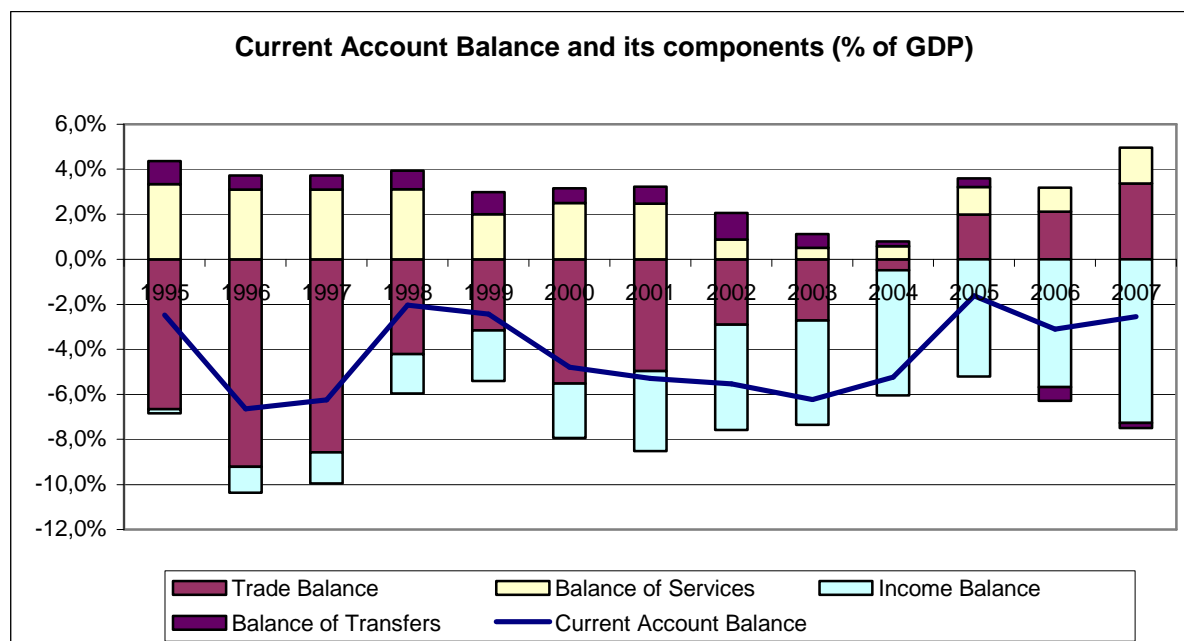
Source: Czech National Bank

The current account is also defined as the difference between investment and saving rate (see theoretical section). For the determination of external economic balance an evaluation of development of those ratios. Both investment and saving rates decreased over time which may be linked to the described life-cycle theory of a transition economy (Mandel et al. 2006) – see the theoretical part for more details. The saving rate remains from 1999 relatively stable with the exception of 2003 and thus does not represent immediate threat to the external economic balance.

Graph no. 3.10

Saving and investment rates
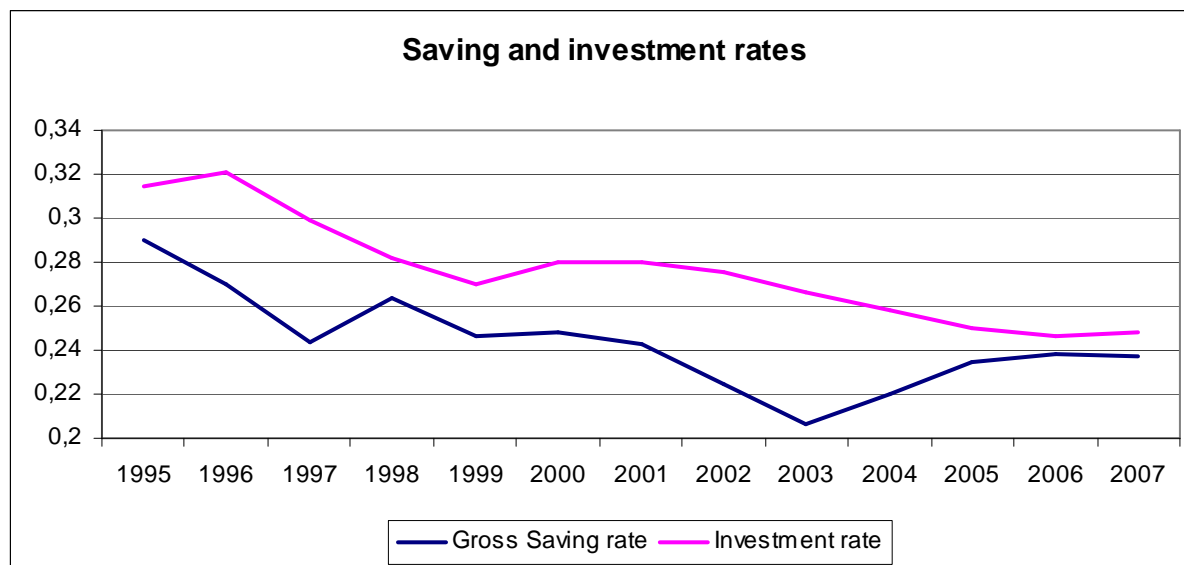
Source: Eurostat

It is important to mention also more in detail the income balance which became the most important component of the current account balance and in the future will represent probably the most important threat to external economic stability.

The income balance consists of several components. The most important is obviously direct investment income. Logically, after the years of relatively strong inflow of FDI the successful investors have started to recuperate the return on the investment and consequently direct investment income registers important deficits. The direct investment income itself consists of three components dividends, reinvested earnings and interests. This division is important as the reinvested earnings are recorded again on credit side of financial account and therefore don't represent a direct threat to external balance. Only dividends and interest payments represent actual outflow of income. On the graph no. 3.12 we can see that until 2002 most of this income was reinvested in the Czech Republic but from that year the share of dividends rose up to about 50% of the whole direct investment income and stabilized on this level. This is linked to the evolution of the transition economy as described in the theoretical part and may represent a problem for the external economic stability of the country. But recent development with the level of reinvested earnings as a percentage of total income outflow stabilized practically from 2003 does not indicate direct threat to the external stability.

Another important component of the income balance is the compensation of employees which was in small surplus in 1995 but then recorded a deficit which deteriorated

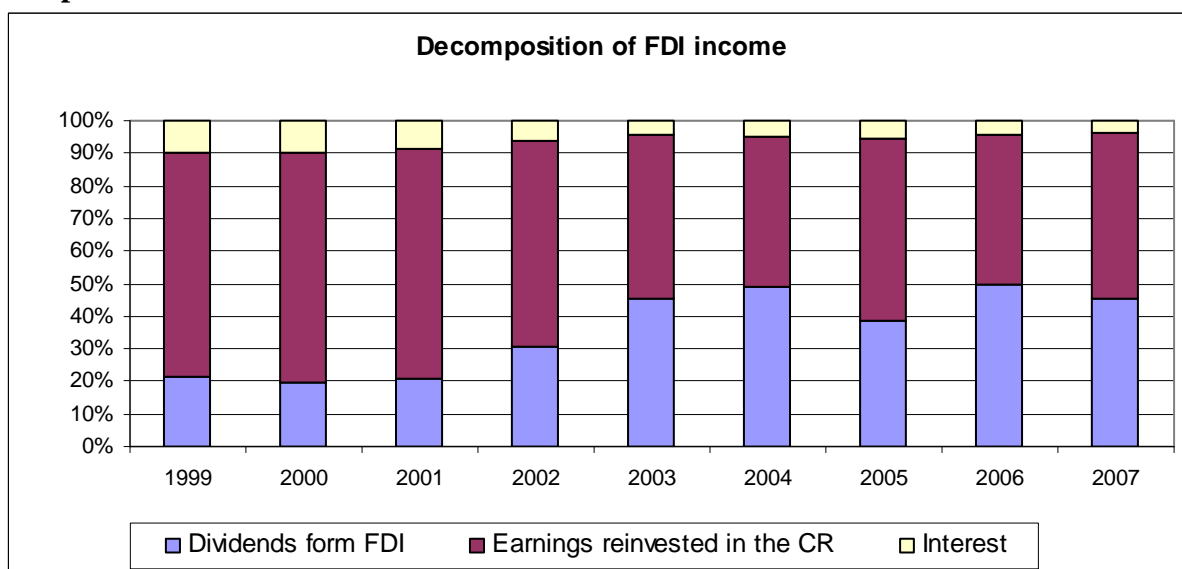especially in last 3 years. This phenomenon is given by the fact than more foreign employees are employed in the Czech companies. The estimate number is 225 thousand of foreigners working in the Czech republic compared to 27 thousand Czech residents working abroad at the end of 2006 (CNB 2006).

Graph no. 3.11
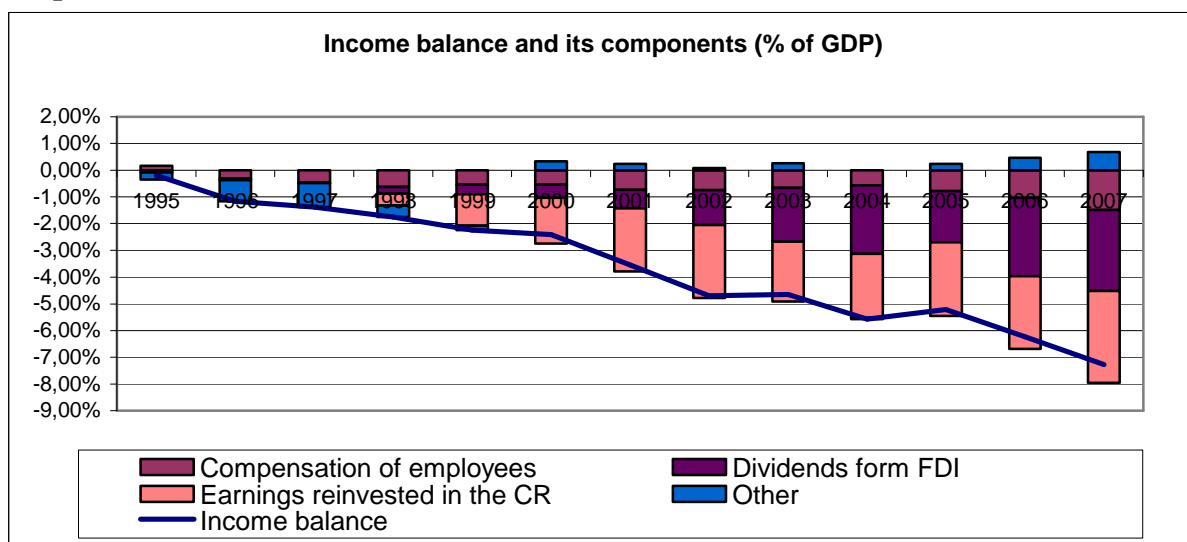
Source: Czech National Bank

Graph no. 3.12

Source: Czech National Bank

3.1.4. Basic balance

External economic stability can be measured on the level of basic balance. In the previous chapters we discussed the advantages as well as the dynamic problems of this approach. Here we will describe the path of the basic in the Czech Republic in the observed period.

The basic balance is based on the idea of non-debt financing of the current account deficit. Sometimes it is called as financing through long-term capital, but it is difficult to determine on available accounts the maturity of financial assets. The basic underlining idea is that non-debt financing is less threatening to the economy as in cases of external shocks foreign investors bear the risk. Therefore it is also less volatile and less prone to external shocks which can be seen on graph no.3.15. Even in the year of monetary crisis the net foreign direct investment as well portfolio investment was positive but it was the category of other investment which registered an outflow. On the other hand large inflows of equity investment create future problems with the income balance addressed earlier.

Some authors include in the non-debt financing only foreign direct investment, others include also equity portfolio investment. For the sake of completeness I will show the evolution of both on the following graphics no. 3.13 resp. no. 3.14.

Graph no. 3.13
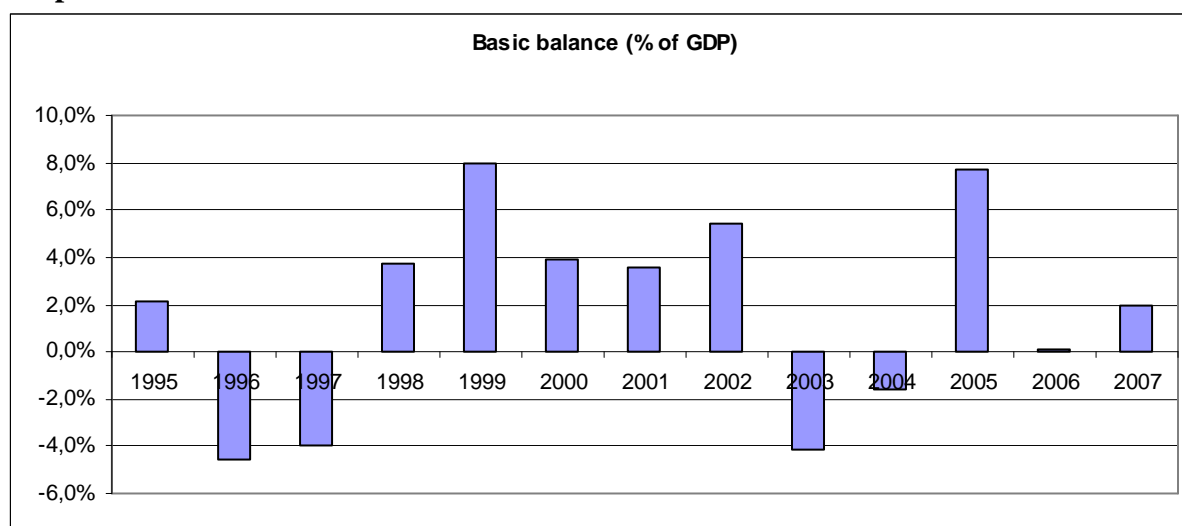
Source: Czech National Bank
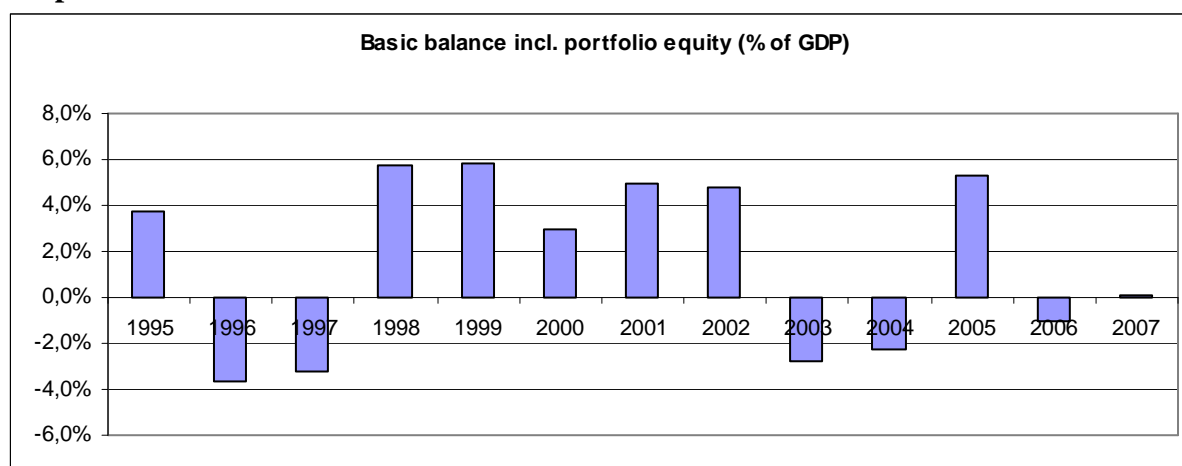
Graph no. 3.14

Source: Czech National Bank

Now we shall describe more in detail the evolution of the important component of the basic balance which is **net foreign direct investment**. The scope of inflow of foreign direct investment is rather variable and depends heavily on the privatization activities of the Czech government. The important increase at the end of nineties is related to the privatization of Czech banks and the investment into retail chains, electricity, gas and water distribution networks (CNB 1999). The extreme value in 2002 is due to among others the privatization of the gas company Transgas (CNB 2002). On the other hand the low value in 2003 was among others caused by extraordinary transactions in advance of privatization of Eurotel and Český telecom which took place together with privatization of Unipetrol and Vítkovice Steal in 2005 and caused the registered peak in FDI inflow. The reinvested earnings start to be an important source of total FDI inflow as shown in the graph 3.17.

The foreign direct investment abroad is in comparison to the inflow negligible as demonstrated on the graph no. 3.16. The more important investment abroad in years 2004, 2006 and 2007 is related to the participation of state owned energy company ČEZ in privatizations in Central and South-Eastern Europe and its acquisitions of local producers and distributors of energy. Other foreign direct investment is also present but still negligible.

Portfolio investment in general depends on the interest revenues on different markets and investment strategy of residents as well as non-resident investors. The investment decision of banks is very important in this balance (CNB 1999, 2000).

Graph no. 3.15
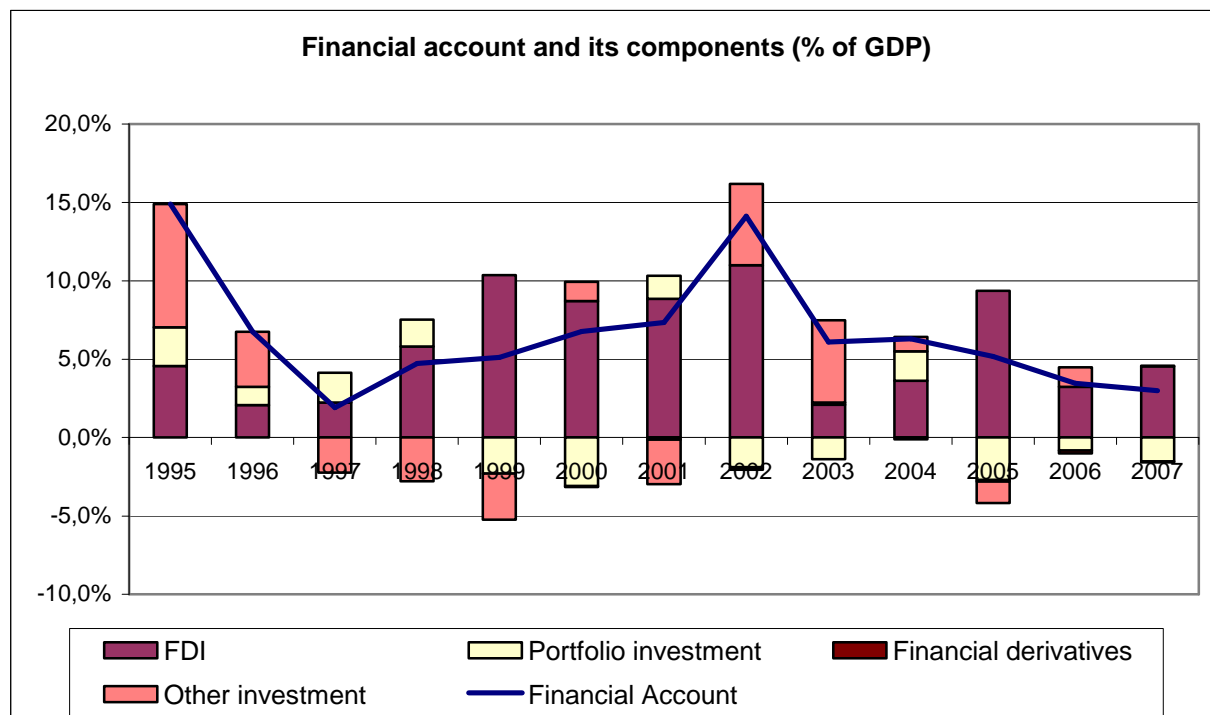
Source: Czech National Bank

Graph no. 3.16

Source: Czech National Bank

Graph no. 3.17

Reinvested earnings as a part of FDI inflow (% of GDP)
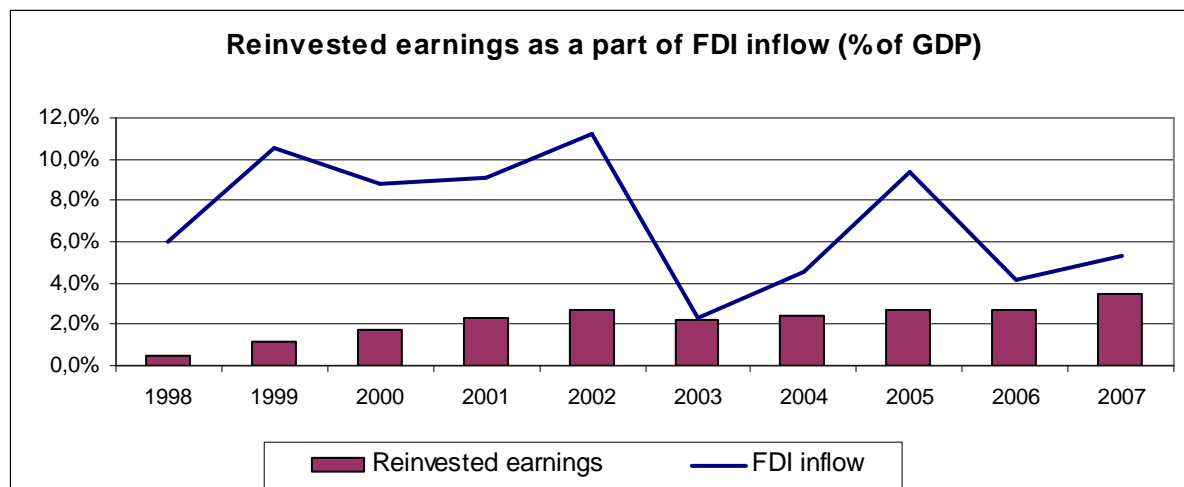
Source: Czech National Bank

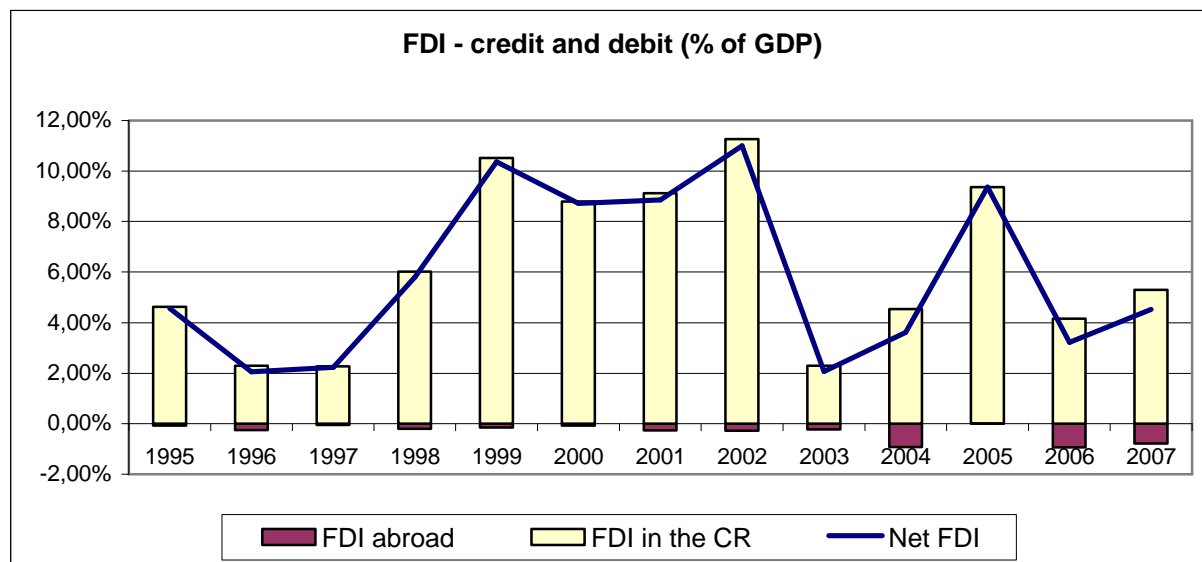The overall basic balance has than the form as depicted in the previous graphs (done for both cases only with FDI and with FDI and portfolio equity investment). We can see that in both cases the balance is for the most of the number of observations positive. Only in 1996, 1997 and 2003 an important deficit is recorded. The first two observations are related to the monetary crisis. From this point of view this indicator can be taken as relevant in determining dangerous external imbalances. The deficit in 2003 has been caused as already mentioned by "extraordinary manipulation with shares of Český telecom and Eurotel" in preparation to their privatization (CNB 2003). This occurred in 2005 when a large surplus of the basic balance was recorded. From this point of view we may consider the deficit as not threatening and in balance. The dynamic problems of this balance will be dealt with in the following empirical part of this paper.

3.1.5. International Investment Position

The international investment position was at the beginning of the transformation positive, however, with the pertaining current account deficits (remember the international investment position depends on the balance of national savings and investment and on valuation changes) the international investment position continuously deteriorated. The current deficits cause the important income balance deficits.

When analyzing the structure of assets and liabilities of the international investment position we should mention several typical features. On the asset account the importance of reserves is slightly diminishing as the level of foreign reserves has been stagnating over the

past five years in absolute terms but diminishing in terms of percentage of GDP as show in the graph 3.22. The share of foreign direct investment abroad is increasing but still relatively insignificant and the share of portfolio investment increases rapidly partially to the detriment of other investment category.

On the liability account the share of foreign direct investment in the Czech Republic became most important in 1999 and is consistently increasing. However the rate at which it increased diminished from its height in 1999 to 2002 with the exception of 2005. The share of portfolio investment increased slightly and the share of other investment is now lower than at the beginning of the observed period when especially in 1997 it represented the highest share of the international investment position.

The international investment position determines the income balance and may indirectly influence exports as well as imports (through indirect influence of FDI stock on those variables). Those relationships will be dealt with in the next empirical part of this paper.

Graph no. 3.18
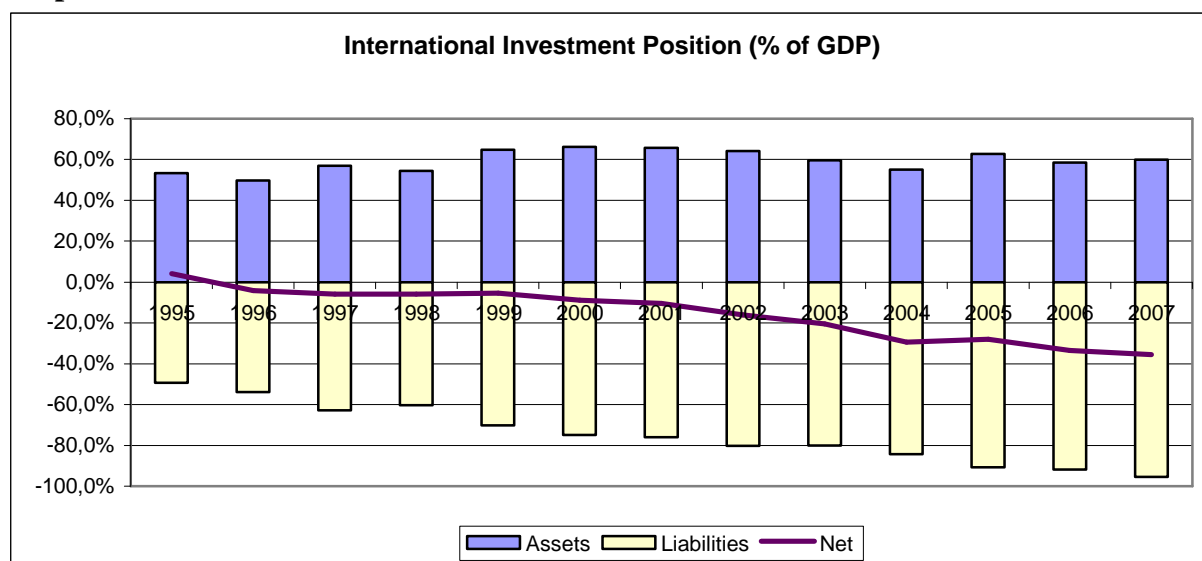
Source: Czech National Bank

Graph no. 3.19

International Investment Position - Assets (% of GDP)

Legend: FDI abroad, Portfolio investment, Financial derivatives, Other investment, Reserves

Source: Czech National Bank

Graph no. 3.20

International Investment Position - Liabilities (% of GDP)

Legend: FDI, Portfolio investment, Financial derivatives, Other investment
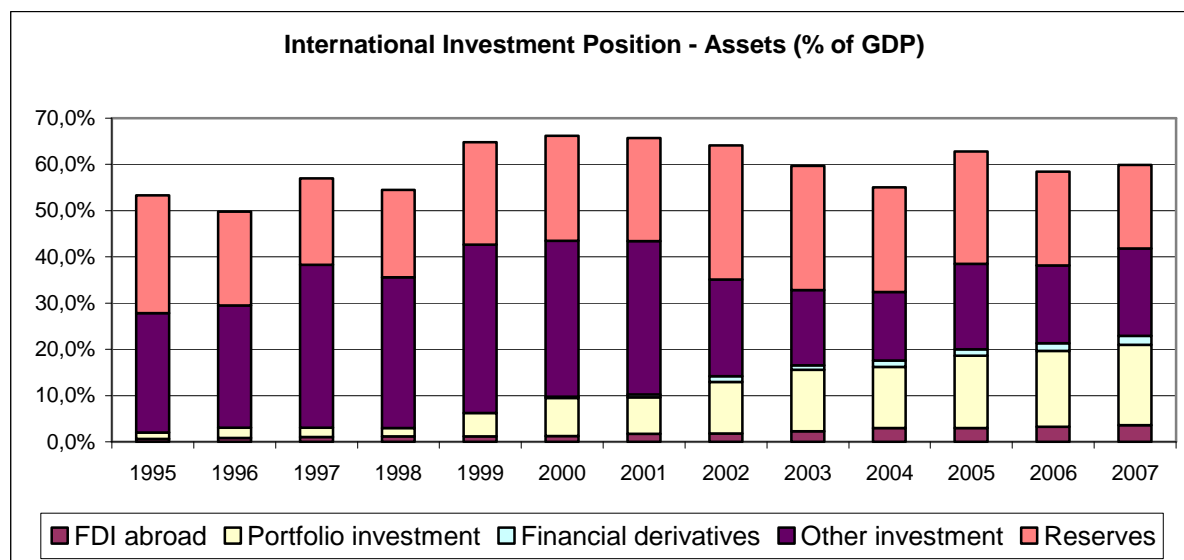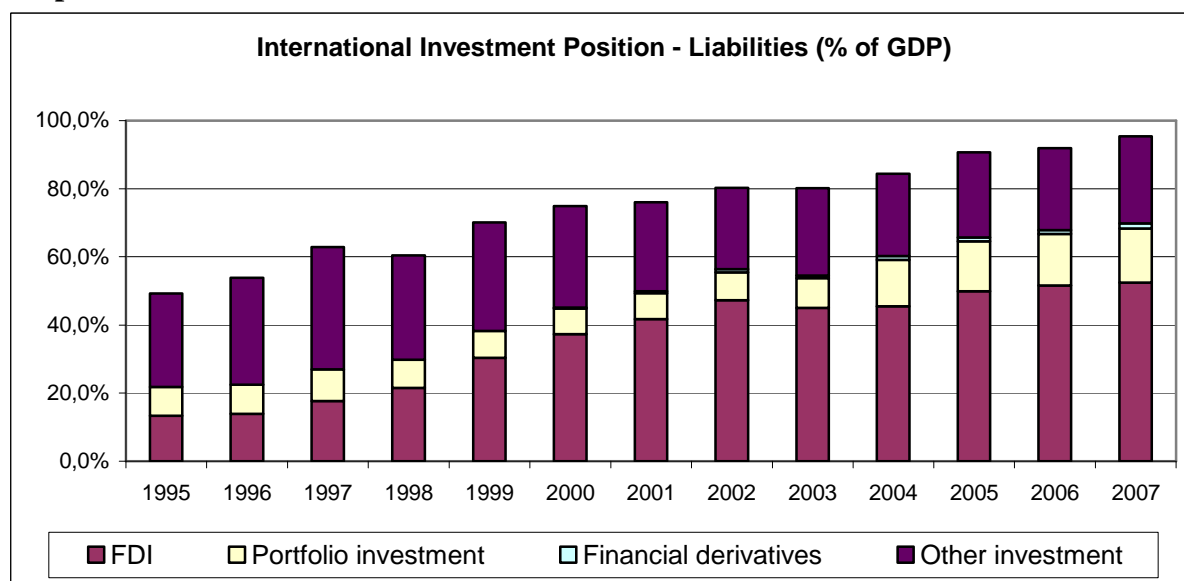
Source: Czech National Bank

3.1.6. External debt

The external debt indicator also recorded interesting evolution in terms of its level as well as in terms of its composition over the observed period.

The debt rapidly increased in the years preceding the monetary crisis. This evolution was characterized by growing debt of bank and corporate sectors which was linked to the capital liberalization and not stabilized banking sector (Helísek 2002). In 1997 the value of

external debt exceeded the benchmark of 40% of GDP. After the monetary crisis the level of debt decreased temporarily but due to low GDP growth and exchange rate depreciation the level of debt approached the critical level again. Fortunately, a downward trend was started and continued until 2002. From 2003 onwards the external debt is again increasing and again approaches the benchmark value of 40% of GDP but this time the government sector is the main source of increasing deficits. We will deal more with the influence of government sector on the external economic balance in the next chapter. However, now it can already be suggested that the evolution of government debt may be threatening for the external economic balance.

Graph no. 3.21

Gross External Debt (% of GDP)

Legend: Government · Czech National Bank · Commercial banks · Other sectors · Direct Investment: Intercompany lending
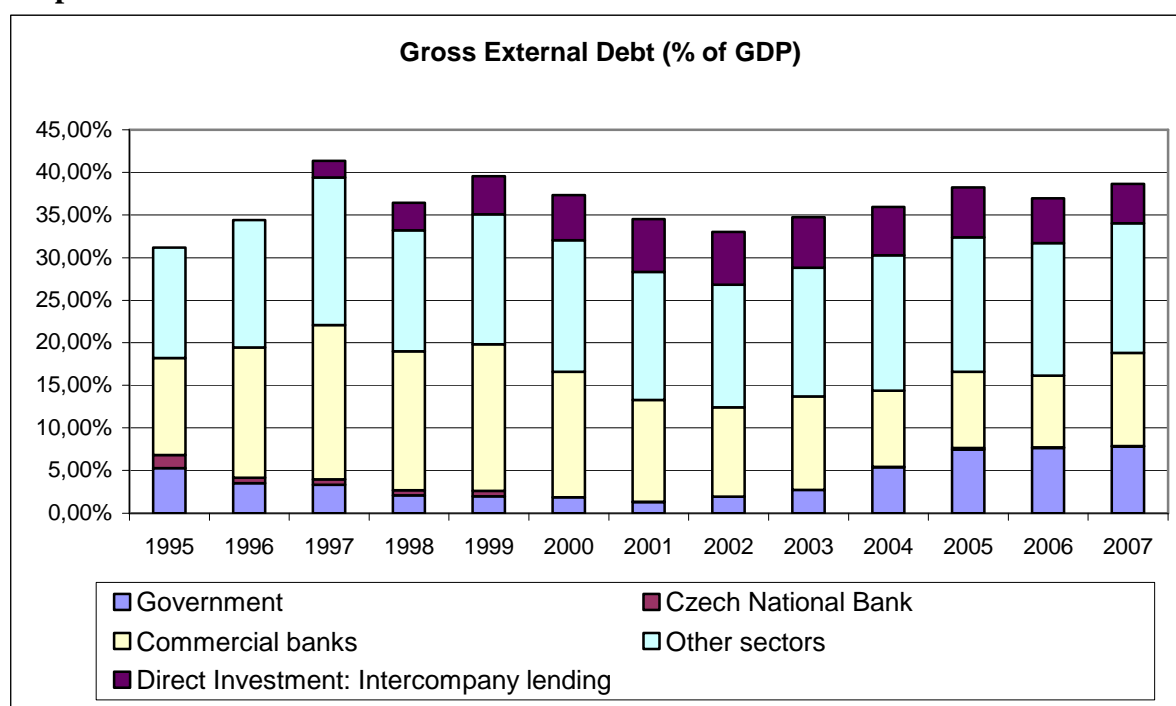
Source: Czech National Bank

3.1.7. Other indicators

Among other indicators we definitely have to mention so called **Import Cover Ratio** which is the ratio of total reserves to average monthly import.

First let me mention the evolution of foreign reserves over the observed period. The reserves decreased in relation to the interventions of Czech National Bank on foreign exchange market before and through the monetary crisis. Over following years reserves were accumulated again. The rate of change was rather stable but tends to decrease in last years.

The exceptionally high increase in 2002 is linked to "the National Property Fund's proceeds from privatization" (CNB 2002). The same applies to the relatively important increase in 2005. When expressed as percent of GDP their level decreases continuously.

The stagnation of total reserves and increasing average monthly imports (see graph 3.6) has implication for decreasing level of Import Cover Ratio (graph 3.22) but it is still above the benchmark value of 3 monthly imports. This decreasing ratio, however, in my opinion shouldn't be considered as a major problem as the trade balance is in surplus and the nominal exchange rate is appreciating.

Graph no. 3.22
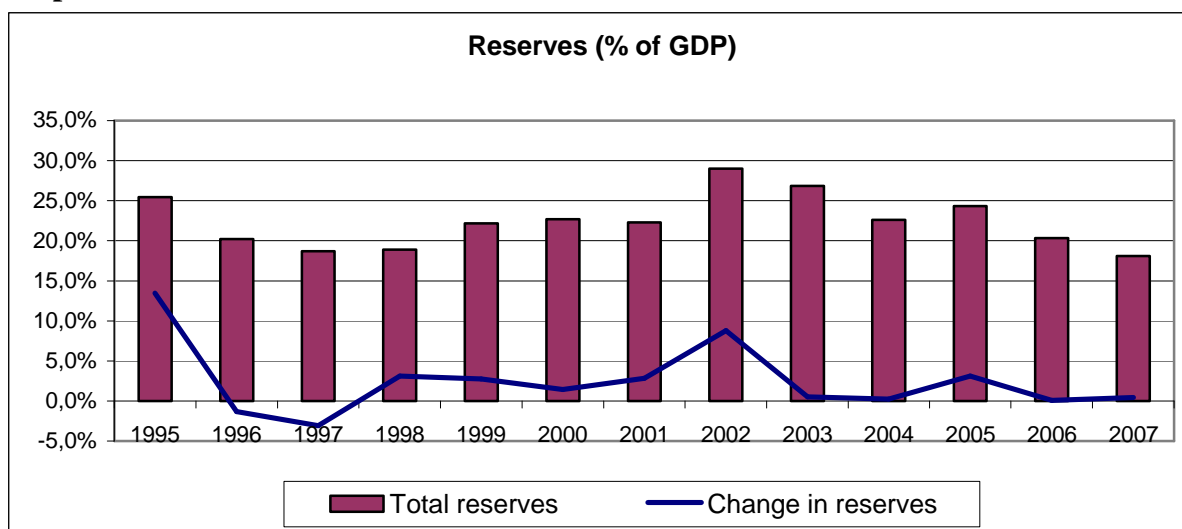
Source: Czech National Bank

Graph no. 3.23
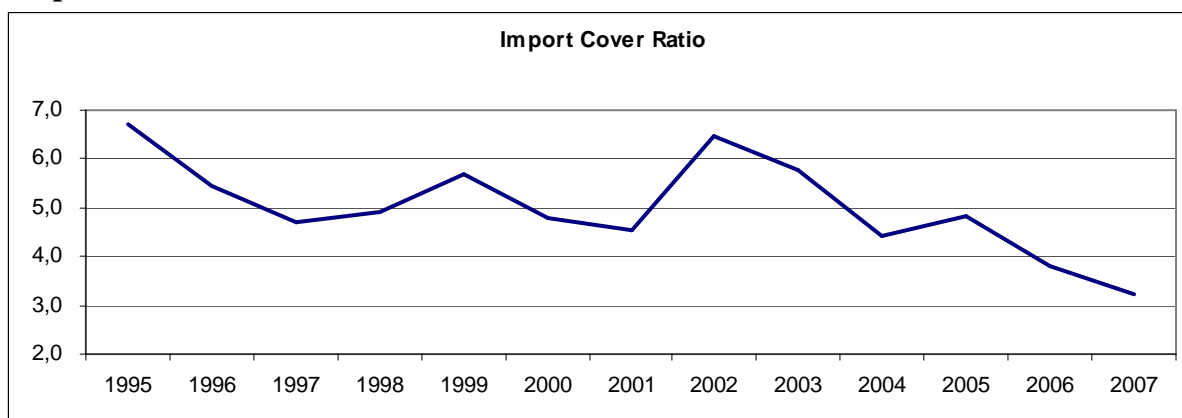
Source: Czech National Bank

3.2.   Determinants of external economic balance

After describing the evolution of various indicators of external balance I would like to deal with the interrelationships between those variables and on the basis of estimated values of those interrelations suggest other tentative judgments about the external economic stability of the Czech Republic.

In previous chapters we have already mentioned various potential determinants influencing the indicators of external balance. In this part of the paper I would like to verify with the use of VAR (Vector Autoregression) and cointegration models the validity of those determinants in the case of the Czech Republic.

Despite the fact that in this paper we stress the importance of basic balance for the external economic stability we won't model it here in aggregate, because one of its most important components the net foreign direct investment is as described in the previous chapter dependent on privatization decisions of government and not directly on other economic fundamentals, therefore it will be considered as exogenous. In the previous chapter we demonstrated that the basic balance is mostly level or in surplus. Here we would like to evaluate structural relations among its components. We will therefore concentrate on the balance of current account determinants and its subparts. The structure of the current account has changed over the observed period and therefore it is interesting to model its parts separately which may display relations that may become insignificant on the aggregate level but may still contribute to indication of the overall external economic stability.

The data used in this part have been gathered mainly from online available sources of Eurostat, Czech National Bank and Czech Statistical Office. In general time series for the Czech Republic are very short and therefore I use quarterly data. However, some important variables have not been published quarterly before 2000 (e.g. international investment position) which again limits the range of time series and negatively influences the accuracy of estimated values of coefficients. However, few interesting relations have been proved with significant relevance and economic implications can be deduced from those results. I used software PcGive. All variables with seasonality have been seasonally adjusted by X12ARIMA technique. I used various levels of representation of time series including normalized to GDP ratios but the most relevant result have been obtained on real absolute

values of variables and fixed based indexes for some variables (e.g. terms of trade or real effective exchange rate).

According to augmented Dickey – Fuller tests (ADF) all used time series were non-stationary and integrated of order I (1) except for the variable "government balance". Therefore we can't perform simple regression analysis but have to proceed to cointegration models where possible.

We will usually start by preliminary VAR models where we use F-tests for determining the number of lags. Consequently we would perform estimation of cointegration models through Johansen procedure. We estimate the number of cointegrating vectors with trace tests and than estimate cointegrated VAR models with proper restrictions.

3.2.1. Imports of goods and services function

The real import of goods and services can be influenced by several variables:

IM = f (IIP, GDP, REER), where

GDP... ....real gross domestic product (The standard Keynesian theory defines the influence of domestic economic growth on demand for imports as the marginal propensity to import.)

IIP...... ....net international investment position (This variable is important in the determination of external economic stability. Its deficit is permanently widening mainly as a result of foreign direct investment inflow. It can thus represent indirectly the influence of foreign direct investment. It is difficult to use directly FDI or lagged FDI variable because of among others extreme volatility of FDI due to e.g. big privatization projects. The net international investment position includes also other sources of investment as well as valuation changes. As a result it is more significant in our models.)

REER......real effective exchange rate (The appreciation of REER should theoretically contribute to higher imports.)

When modeled in the VAR model the results are the following:

SYS(1) Estimating the system by OLS (using CR_Q.xls)
    The estimation sample is: 2000 (2) to 2007 (4)

Where	rIM_SA	real import seasonally adjusted
	rnIIP_SA	real net international investment position
	rGDP_SA	real gross domestic product seasonally adjusted
	rIM_SA_1	means lagged variable rIM_SA of 1 period

URF equation for: rIM_SA

	Coefficient	Std.Error	t-value	t-prob
rIM_SA_1	0.650067	0.1142	5.69	0.000
rnIIP_SA_1	-0.0853643	0.02550	-3.35	0.002
rGDP_SA_1	0.177815	0.05648	3.15	0.004
D1 U	57610.1	1.145e+004	5.03	0.000
D2 U	-42760.2	1.176e+004	-3.64	0.001

sigma = 11156.7   RSS = 3236247344

F-test on regressors except unrestricted: $F_{(9,58)}$ = 2751.92 [0.0000] **
F-tests on retained regressors, $F_{(3,24)}$ =

rIM_SA_1	11.0943 [0.000]**	rnIIP_SA_1	20.6907 [0.000]**
rGDP_SA_1	716.789 [0.000]**	D1 U	8.10727 [0.001]**
D2 U	4.36293 [0.014]*		

REER was not relevant in VAR neither in cointegration analysis. It was also necessary to include dummy variables to solve the problem of non-normality. The potential explanation for D1 dummy, which has value of 1 in second quarter of 2004 may be the entrance into the European Union and changed methodology of accounting import data, which was done FOB before accession and from then on CIF (CNB 2006). However the export data as shown later on will record similar jump in exports and exports were recorded all the time FOB. Therefore either there was another change in methodology affecting both exports and imports or the entrance itself to the European Union increased credibility of the Czech Republic in the eyes of trading partners or dissolved the last limits to trade and thus helped especially small or medium sized companies to enter more easily in international trade with EU countries. The latter reason, however, seems less probable because it is not clear why it would be such a "jump" rather than a gradual increase. I also tried a dummy variable with 1 from period 2004Q02 onward but this one was less relevant.

Graph no 3.24
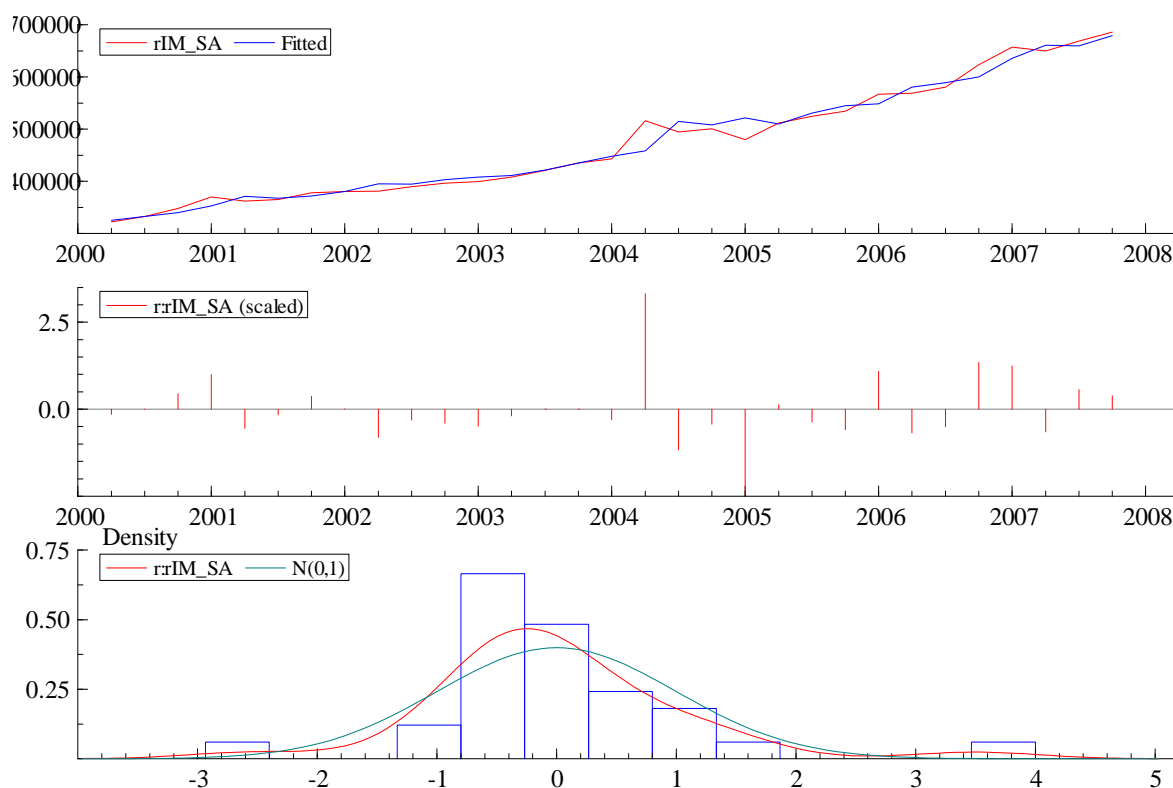
The graph no. 3.24 shows the non-normality of residuals before the introduction of dummy variables. It is possible to clearly see the extreme values in 2004Q02 (D1) and 2005Q01 (D2). After the introduction of dummy variables the tests for autocorrelation, normality and heteroskedasticity are regular.

Vector Portmanteau(4):	37.3387
Vector AR 1-3 test:	$F(27,44) = 1.4494 [0.1343]$
Vector Normality test:	$\text{Chi}^2(6) = 7.5509 [0.2729]$
Vector hetero test:	$F(36,64) = 0.67105 [0.9016]$
Vector hetero-X test:	$F(54,60) = 0.71739 [0.8917]$

We can therefore proceed to cointegration. Trace test indicate that there is only one cointegrating vector.

The cointegration vector beta which represents the long-run relationships is as follows:

SYS(2) Cointegrated VAR (using CR_Q.xls)
    The estimation sample is: 2000 (2) to 2007 (4)

Cointegrated VAR (1) in:
[0] = rIM_SA
[1] = rnIIP_SA
[2] = rGDP_SA
Unrestricted variables:
[0] = D1
[1] = D2
Number of lags used in the analysis: 1

	beta	Standard errors of beta
rIM_SA	1.0000	0.00000
rnIIP_SA	0.37211	0.066639
rGDP_SA	-0.64804	0.061255

From VAR model we thus obtained:

rIM_SA = 0.650067 rIM_SA_1 - 0.0853643 rnIIP_SA_1 + 0.177815 rGDP_SA_1 + 57610.1 D1 - 42760.2 D2

From the cointegration relation:

rIM_SA = - 0. 37211 rnIIP_SA + 0.64804 rGDP_SA

In the VAR model the import is significantly dependent on its lagged value and coefficients at other variables may be therefore undermined. In the long run the marginal propensity to import from GDP should be 0,65% and the deficit of international investment position increases real import by 37,2% of its value[11]. The time series are short and therefore we cannot take the estimates of variable as very accurate, however, it is clear that the influence of GDP and IIP (resp. indirectly FDI) on import is important. Especially the relatively high value of estimated coefficient at IIP might be worrying for the external economic stability.

We can also substitute GDP by real export and absorption (domestic demand) and determine import function as follows:

IM = f (IIP, Abs, EX), where

---

[11] This relationship is may be caused by the import of investment goods as a result of foreign direct investment.

EX...........real export (The potential relationship may determine import intensity of exports which may be considered as an important indicator of external stability as well. The less imports are necessary to export goods and services, the more easily can the country outweigh the deficit of income balance.)

Abs ....absorption or domestic demand (a lower coefficient would mean that domestic demand is covered substantially by home production (Mandel et al 2006))

When modeled in the VAR model the results are the following:

SYS(3) Estimating the system by OLS (using CR_Q.xls)
    The estimation sample is: 2000 (2) to 2007 (4)

URF equation for: rIM_SA
	Coefficient	Std.Error	t-value	t-prob
rIM_SA_1	-0.219337	0.1807	-1.21	0.237
rnIIP_SA_1	-0.0313740	0.02368	-1.32	0.198
rEX_SA_1	0.699589	0.1368	5.12	0.000
rAbs_SA_1	0.673534	0.1476	4.56	0.000
D1 U	58879.0	8479.	6.94	0.000
D2 U	-34226.7	8570.	-3.99	0.001
Constant U	-242968.	7.156e+004	-3.40	0.002

sigma = 7807.86   RSS = 1463104704

F-test on regressors except unrestricted: F(16,64) = 51.5059 [0.0000] **
F-tests on retained regressors, F(4,21) =
rIM_SA_1	8.47754 [0.000]**	rnIIP_SA_1	6.69177 [0.001]**
rEX_SA_1	27.7310 [0.000]**	rAbs_SA_1	6.39462 [0.002]**
D1 U	13.4567 [0.000]**	D2 U	4.53737 [0.008]**
Constant U	5.63402 [0.003]**		

It is necessary to include again the dummy variables D1 and D2. REER is again insignificant.

Vector Portmanteau(4): 68.3445
Vector AR 1-3 test:	F(48,36) = 0.95768 [0.5608]
Vector Normality test:	Chi^2(8) = 9.8834 [0.2733]
Vector hetero test:	F(80,46) = 0.65517 [0.9514]
Vector hetero-X test:	F(140,17)= 0.24636 [1.0000]

We can proceed to cointegration. Trace test indicate that there is only one cointegrating vector:

I(1) cointegration analysis, 2000 (2) to 2007 (4)
H0:rank<=	Trace test [Prob]
0	64.460 [0.000] **
1	21.015 [0.367]
2	9.4463 [0.332]
3	0.65685 [0.418]

The cointegration vector beta which represents the long-run relationships is as follows:

SYS(4) Cointegrated VAR (using CR_Q.xls)
      The estimation sample is: 2000 (2) to 2007 (4)
Cointegrated VAR (1) in:
[0] = rIM_SA
[1] = rnIIP_SA
[2] = rEX_SA
[3] = rAbs_SA
Unrestricted variables:
[0] = D1
[1] = D2
[2] = Constant
Number of lags used in the analysis: 1

	Beta	Standard errors of beta
rIM_SA	1.0000	0.00000
rnIIP_SA	0.014261	0.015577
rEX_SA	-0.57239	0.043303
rAbs_SA	-0.60130	0.080148

The variable international investment position becomes insignificant in this estimation.

If we estimate the VAR and coitegration models again without IIP we obtain the following:

SYS(5) Estimating the system by OLS (using CR_Q.xls)
      The estimation sample is: 1998 (2) to 2007 (4)

URF equation for: rIM_SA

	Coefficient	Std.Error	t-value	t-prob
rIM_SA_1	-0.132960	0.1669	-0.797	0.431
rEX_SA_1	0.707467	0.1214	5.83	0.000
rAbs_SA_1	0.665617	0.1217	5.47	0.000
D1 U	60088.2	8226.	7.30	0.000
D2 U	-30565.4	8006.	-3.82	0.001
Constant U	-263445.	5.206e+004	-5.06	0.000

sigma = 7658.49   RSS = 1935531993
F-test on regressors except unrestricted: $F(9,75) = 140.486 \, [0.0000]$ **
F-tests on retained regressors, $F(3,31) =$
   rIM_SA_1   10.9252 [0.000]**   rEX_SA_1   41.8738 [0.000]**
   rAbs_SA_1   14.3922 [0.000]**   D1 U   20.1652 [0.000]**
   D2 U   4.91773 [0.007]**   Constant U   13.1211 [0.000]**

With dummy variables the normality test, the AR 1-3 autocorrelation tests as well as heteroskedasticity tests does not indicate a problem.

Vector Portmanteau(5): 57.503
Vector AR 1-3 test: $F(27,64) = 1.3241 \, [0.1790]$
Vector Normality test: $Chi^2(6) = 1.5114 \, [0.9587]$

Vector hetero test: $F(36,94) = 0.70510 [0.8810]$
Vector hetero-X test: $F(54,96) = 0.66826 [0.9465]$

The trace test indicates the presence of one cointegraiting vector:

I(1) cointegration analysis, 1998 (2) to 2007 (4)
H0:rank<= Trace test [Prob]
     0   60.272 [0.000] **
     1   13.537 [0.096]
     2   3.2570 [0.071]

SYS(6) Cointegrated VAR (using CR_Q.xls)
      The estimation sample is: 1998 (2) to 2007 (4)

Cointegrated VAR (1) in:
[0] = rIM_SA
[1] = rEX_SA
[2] = rAbs_SA
Unrestricted variables:
[0] = D1
[1] = D2
[2] = Constant
Number of lags used in the analysis: 1

	Beta	Standard errors of beta
rIM_SA	1.0000	0.00000
rEX_SA	-0.59086	0.037256
rAbs_SA	-0.64392	0.073014

The VAR indicates the following relationships:

rIM_SA = - 263445. + 0.707467 rEX_SA_1 + 0.665617 rAbs_SA_1 + 60088.2 D1 -30565.4 D2

From the cointegration analysis we may obtain the following estimates of long-run relationships:

rIM_SA = 0.59086 rEX_SA + 0.64392 rAbs_SA

The import intensity of exports is 0,70 in VAR resp. 0,59 in the cointegration model. Those estimated values are relatively low in comparison to e.g. results in Mandel et al. (2006) and therefore positive and would indicate that in later period (in our care 1998Q02 – 2007Q04) the scope of domestic subcontractors of exporting producers has increased. The estimated coefficient for absorption is very similar to the coefficient in the previous model for GDP and would indicate similar marginal propensity to import from GDP and absorption.

3.2.2. Export of goods and services function

The export function may depend on following variables:

EX = f (IIP, REER, GDP_GER), where

IIP ....international investment position (similarly as in the case of imports the variable may be used as a proxy for foreign direct investment)

REER......reel effective exchange rate (despite not being significant in the case of imports might be in the case of exports)

GDP_GER…real gross domestic product in Germany (Germany is the biggest trading partner of the Czech Republic and exports are according to standard economic theory dependent on GDP development in the exporting markets. For this variable we used fixed based index (1995=100) because in case of measurement in national currency the estimated coefficient would be more difficult to interpret.)

The export function similarly to the import shows an unexplained (by mentioned variables) "jump" in the second quarter of 2004. This may be caused by the change in methodology but according to my information the change concerned primarily imports and exports were and continue to be priced FOB. Other option is the already mentioned hypothesis about the contribution of the accession to the European Union to higher trade integration through higher credibility and lower trade barriers but this may be questionable because the change is so abrupt.

In any case the non-normality shown in the graph no. 3.25 can be removed using dummy variables. In this case we can use either D3 (1 for all periods after 2004Q02) or D1 (1 only for 2004Q02), both are significant and the models yields slightly different result therefore I would like to show them both.

Graph no. 3.25
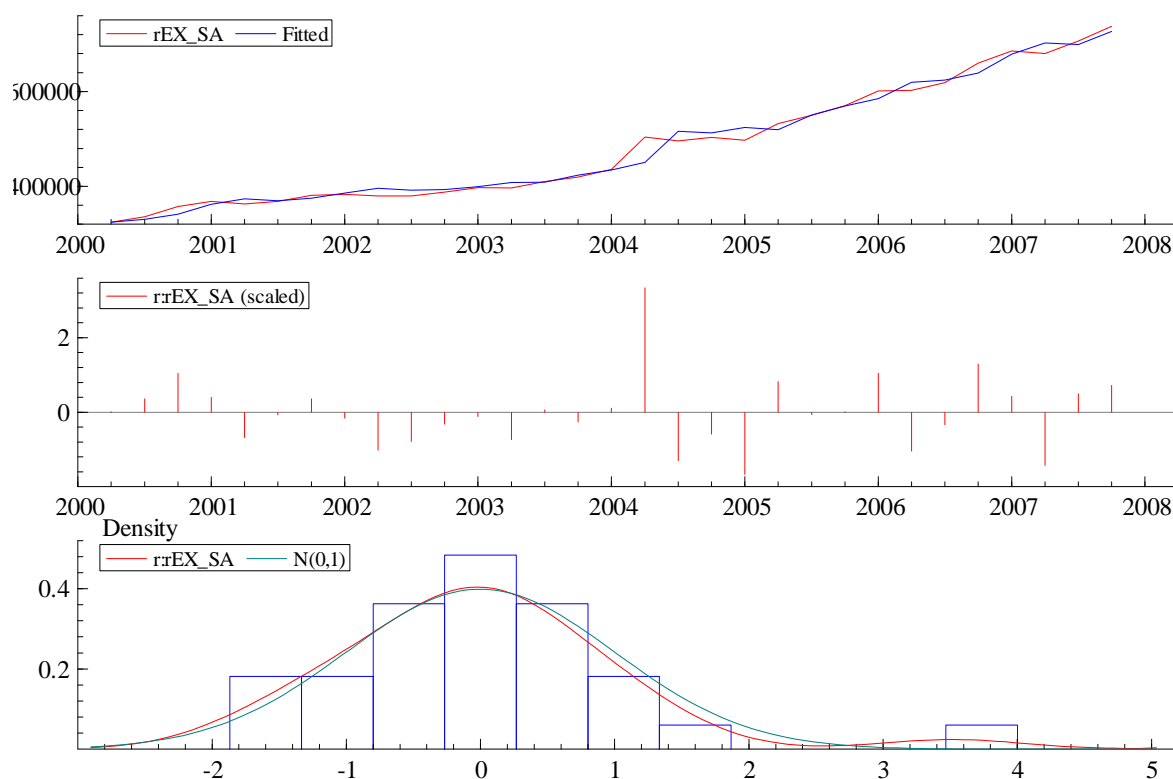
When including D3 we obtain following VAR model (REER proved to be insignificant again):

SYS(3) Estimating the system by OLS (using CR_Q.xls)
    The estimation sample is: 2000 (1) to 2007 (4)

URF equation for: rEX_SA

	Coefficient	Std.Error	t-value	t-prob
rEX_SA_1	0.525214	0.1697	3.09	0.005
rnIIP_SA_1	-0.0475736	0.04022	-1.18	0.247
GDP_GER_SA_1	10207.3	3566.	2.86	0.008
Constant U	-967430.	3.481e+005	-2.78	0.010
D3 U	43531.8	1.430e+004	3.04	0.005

sigma = 13803.8   RSS = 5144701621

F-test on regressors except unrestricted: $F_{(9,60)}$ = 44.3279 [0.0000] **
F-tests on retained regressors, $F_{(3,25)}$ =

rEX_SA_1	4.97449 [0.008]**	rnIIP_SA_1	9.28460 [0.000]**
GDP_GER_SA_1	11.1068 [0.000]**	Constant U	8.54275 [0.000]**
D3 U	4.87868 [0.008]**		

According to trace tests there is only one cointegrating vector:

I(1) cointegration analysis, 2000 (1) to 2007 (4)
H0:rank<= Trace test [Prob]
    0   31.475 [0.031] *
    1   4.7363 [0.833]
    2   0.016710 [0.897]

SYS(4) Cointegrated VAR (using CR_Q.xls)
    The estimation sample is: 2000 (1) to 2007 (4)

Cointegrated VAR (1) in:
[0] = rEX_SA
[1] = rnIIP_SA
[2] = GDP_GER_SA
Unrestricted variables:
[0] = D3
[1] = Constant
Number of lags used in the analysis: 1

	Beta	Standard errors of beta
rEX_SA	1.0000	0.00000
rnIIP_SA	0.14842	0.028223
GDP_GER_SA	-19261.	1859.3

From VAR we obtained the following estimates:

rEX_SA = - 967430. + 0.525214 rEX_SA_1 - *0.0475736 rnIIP_SA_1* **+ 10207.3 GDP_GER_SA_1 + 43531.8 D3**

From the cointegration analysis we may obtain the following estimates of long-run relationships:

rEX_SA = - *0.14842 rnIIP_SA* + **19261. GDP_GER_SA**

Both cointegration and VAR models support the influence of GDP development in Germany on Czech exports. The estimated coefficient may be interprets as follows: a rise of German GDP by 1 percent would cause an increase in import of 19261 mil. CZK in 2005 prices which represents e.g. cca 1% of exports in 2005. The relevance of international investment position is not significant.

When using D1 dummy we obtain following VAR model:

SYS(5) Estimating the system by OLS (using CR_Q.xls)
      The estimation sample is: 2000 (1) to 2007 (4)

URF equation for: rEX_SA

	Coefficient	Std.Error	t-value	t-prob
rEX_SA_1	0.892549	0.1278	6.99	0.000
rnIIP_SA_1	-0.0382023	0.03575	-1.07	0.295
GDP_GER_SA_1	2302.94	2399.	0.960	0.346
Constant U	-220175.	2.362e+005	-0.932	0.359
D1 U	55334.3	1.259e+004	4.40	0.000

sigma = 12214.4   RSS = 4028151399

F-test on regressors except unrestricted: F(9,60) = 138.345 [0.0000] **
F-tests on retained regressors, F(3,25) =

rEX_SA_1	19.2584 [0.000]**	rnIIP_SA_1	9.93036 [0.000]**
GDP_GER_SA_1	25.7522 [0.000]**	Constant U	4.30545 [0.014]*
D1 U	8.67843 [0.000]**		

I(1) cointegration analysis, 2000 (1) to 2007 (4)

H0:rank<=	Trace test [Prob]
0	43.226 [0.000] **
1	5.5298 [0.495]
2	0.052418 [0.876]

SYS(6) Cointegrated VAR (using CR_Q.xls)
      The estimation sample is: 2000 (1) to 2007 (4)

Cointegrated VAR (1) in:
[0] = rEX_SA
[1] = rnIIP_SA
[2] = GDP_GER_SA
Unrestricted variables:
[0] = D1
Number of lags used in the analysis: 1

	Beta	Standard errors of beta
rEX_SA	1.0000	0.00000
rnIIP_SA	0.22301	0.058330
GDP_GER_SA	-1830.1	330.26

In the VAR model the relationships are not significant only the estimated coefficient for lagged export is significant and close to one, which is not present in the model with D3 dummy variable. From this point of view the model with D3 is more appropriate. However, the cointegration relationship exists even here and the estimated coefficient for international investment position is significant but the coefficient for German GDP looses its magnitude.

rEX_SA = - 0.22301 rnIIP_SA + 1830.1 GDP_GER_SA

3.2.3. Income balance

The income balance can be defined as a function of international investment position:

NY = f (IIP), where

NY ....net income

IIP ....international investment position (It is clear that the outflow of income recorded in the Czech Republic is a result of high international investment position deficit. The relationship should be in this case highly significant.)

SYS(7) Estimating the system by OLS (using CR_Q.xls)
     The estimation sample is: 2000 (2) to 2007 (4)

URF equation for: rIncome_SA

	Coefficient	Std.Error	t-value	t-prob
rIncome_SA_1	0.0690781	0.2075	0.333	0.742
rnIIP_SA_1	0.0403717	0.009763	4.14	0.000
Constant U	-10753.5	3523.	-3.05	0.005

sigma = 7243.16   RSS = 1468974661

F-test on regressors except unrestricted: F(4,54) = 79.6078 [0.0000] **
F-tests on retained regressors, F(2,27) =
   rIncome_SA_1   0.0633523 [0.939]   rnIIP_SA_1   121.452 [0.000]**
   Constant U   4.49689 [0.021]*
I(1) cointegration analysis, 2000 (2) to 2007 (4)
 H0:rank<=   Trace test [Prob]
    0   18.899 [0.013] *
    1   0.023061 [0.879]

SYS(8) Cointegrated VAR (using CR_Q.xls)
     The estimation sample is: 2000 (2) to 2007 (4)

Cointegrated VAR (1) in:
[0] = rIncome_SA
[1] = rnIIP_SA
Unrestricted variables:
[0] = Constant
Number of lags used in the analysis: 1

	Beta	Standard errors of beta
rIncome_SA	1.0000	0.00000
rnIIP_SA	-0.043118	0.0041952

From VAR we obtained the following estimates:

rIncome_SA = 0.0403717 rnIIP_SA_1

From the cointegration analysis we may obtain the following estimates of long-run relationships:

rIncome_SA = 0.043118 rnIIP_SA

Both VAR and cointegration model produced similar estimates according to which about 4% of the net IIP should correspond to net income outflow.

3.2.4. Current account

Now after the analysis of the most important components of current account we may try to empirically verify the determinants of the whole current account balance. We will also make reference to the theory presented in previous chapters. The possible determinants of current account balance are the following.

Economic growth: The economic growth does not have an unambiguous influence on current account balance. According to the standard intertemporal model temporary high output should induce individuals wanting to smooth consumption over periods to save more and thus contribute to the current account surplus. On the other hand a permanent rise in output shouldn't influence the current account balance unless it is interpreted as an indicator of a rise of permanent output in the future as well. In this case individuals smoothing consumption over periods may lower their savings and cause current account to move to deficit.

Government balance: As we have demonstrated in the theoretical part on Bussière model Ricardian equivalence may not hold and a government deficit would then cause a current account deficit and thus producing the phenomena of twin deficits.

Hypothesis of stages of development: According to this theory countries with lower relative output are more likely to record a current account deficit because they import capital needed for their development (Melecký 2001). A particular form of similar model was presented in the theoretical section.

Openness of the economy: Theoretically countries with higher openness are less likely to default as was mentioned in the theoretical section. However to prove such a factor longer time series or panel data analysis would be probably needed.

Of course we have to mention also variables that were important when modeling the the components of current account balance such as international investment position. Some authors include among determinants other variables such as terms of trade, but those were insignificant in this empirical estimation.

From the above mentioned possible determinants several variables weren't significant in the observed period e.g. openness of the economy, terms of trade and relative gross domestic product to Germany (in absolute terms as well as in purchasing power standard). The following VAR summarizes the significant determinants:

SYS(9) Estimating the system by OLS (using CR_Q.xls)
  The estimation sample is: 2000 (1) to 2007 (3)

URF equation for: rCA_SA

	Coefficient	Std.Error	t-value	t-prob
rCA_SA_1	0.560147	0.1156	4.85	0.000
rGDP_SA_1	-0.302633	0.09532	-3.17	0.004
rnIIP_SA_1	-0.0784711	0.02359	-3.33	0.003
rGov_bal_SA_1	0.254791	0.07620	3.34	0.003
Constant U	161401.	5.408e+004	2.98	0.006

sigma = 6667.53   RSS = 1155854473

F-test on regressors except unrestricted: $F(16,70) = 57.9083$ [0.0000] **
F-tests on retained regressors, $F(4,23) =$
   rCA_SA_1   6.10018 [0.002]**   rGDP_SA_1   88.6267 [0.000]**
   rnIIP_SA_1 8.68333 [0.000]**   rGov_bal_SA_1   3.47256 [0.023]*
   Constant U   3.95355 [0.014]*

From the VAR we can draw following influences:

rCA_SA =   161401. + 0.560147 rCA_SA_1 - 0.302633 rGDP_SA_1 - 0.0784711 rnIIP_SA_1 + 0.254791 rGov_bal_SA_1

Current account balance is determined by its lagged value which is in line with the model of Bussière and due to habit persistence. However, it can also mean that the current account balance is not satisfactory explained by other variables.

The development of **domestic GDP** is important as well. A rise in the GDP would cause a deficit of current account which would suggest that a rise is interpreted as an indicator of further future rise in permanent income.

Interestingly the **net international investment position** is significant with a negative sign suggesting that a deficit of net international investment position is increasing current account surplus. The estimates form such a short period of time should be interpreted with some reserve, however, this result would mean that the rise in exports as a result of IIP deficit outweighs the negative influence on income balance and the influence of IIP on imports is limited and probably mediated by exports as suggested in the estimates of import function.

Last significant factor is the **government balance** which confirms the Bussière model prediction that a government deficit would cause current account balance. This would have an important implication for the external stability condition which would depend importantly on the government budget balance. In the previous chapter we demonstrated that government debt is also responsible for significant increase of foreign debt which again approaches the traditional benchmark value for sustainability i.e. 40% of GDP. To maintain the external balance the government should try to moderate its budget deficits. Hopefully after a period of high imbalances at the beginning of this decade the government reduced the deficits and the aim to fulfill Maastricht criteria necessary for the entrance to the euro zone may keep the imbalances in reasonable levels.

Unfortunately the government balance time series is already stationary according to ADF tests therefore we cannot confirm the results in a cointegration model for government balance. However, we may substitute the government balance by government expenditure which is already integrated of order I(1). The resulting VAR is the following:

SYS(10) Estimating the system by OLS (using CR_Q.xls)
    The estimation sample is: 2000 (1) to 2007 (3)

URF equation for: rCA_SA

	Coefficient	Std.Error	t-value	t-prob
rCA_SA_1	0.497267	0.1173	4.24	0.000
rGex_SA_1	-0.251459	0.07798	-3.22	0.003
rGDP_SA_1	-0.254332	0.09534	-2.67	0.013
rnIIP_SA_1	-0.0976318	0.02509	-3.89	0.001
Constant U	185635.	5.675e+004	3.27	0.003

sigma = 6738.82   RSS = 1180703201

F-test on regressors except unrestricted: $F(16,70) = 60.7306$ [0.0000] **
F-tests on retained regressors, $F(4,23) =$
   rCA_SA_1   5.51015 [0.003]**   rGex_SA_1   4.54193 [0.008]**
   rGDP_SA_1   89.1876 [0.000]**   rnIIP_SA_1   7.63650 [0.000]**
   Constant U   5.15347 [0.004]**

Now all the time series are non-stationary and integrated of order I(1), we may therefore proceed with the cointgretion analysis. The trace test indicates the presence of one cointegrated vector. Its estimate is the folloving:

SYS(11) Cointegrated VAR (using CR_Q.xls)
    The estimation sample is: 2000 (1) to 2007 (3)

Cointegrated VAR (1) in:
[0] = rCA_SA
[1] = rGex_SA
[2] = rGDP_SA
[3] = rnIIP_SA
Unrestricted variables:
[0] = Constant
Number of lags used in the analysis: 1

	Beta	Standard errors of beta
rCA_SA	1.0000	0.00000
rGex_SA	0.46298	0.11041
rGDP_SA	0.43222	0.13578
rnIIP_SA	0.19221	0.035618

From second VAR we obtained the following estimates:

rCA_SA = 185635. + 0.497267 rCA_SA_1 - 0.251459 rGDP_SA_1 - 0.0976318 rnIIP_SA_1 - 0.251459 rGex_SA_1

From the cointegration analysis we obtained the following estimates of long-run relationships:

rCA_SA = - 0.46298 rGex_SA - 0.43222 rGDP_SA - 0.19221 rnIIP_SA

Those results confirm the significance of relationships estimated in the previous VAR and even the coefficient for net international investment position in cointegration model is higher and thus may suggest that the deficit of IIP is really relatively benign for the external economic stability in the case of the Czech Republic. The relevance of GDP is confirmed as well and probably plays an important role in saving / consumption decisions of residents. The relatively high importance of government expenditure may be considered by residents as temporary and therefore influences current account in the way as predicted by the standard intertemporal model. This result may somehow weaken the previous interpretation significance of government deficits according to Bussière model. However, given the

previous analysis of government influence on foreign debt I believe that government budget balance is still a highly important determinant of external economic stability.

Conclusions

The purpose of this paper was to asses the external economic stability of the Czech Republic. In the first chapter we presented various standard indicators of external economic stability. Consequently we reviewed the theory related to its assessment. The theoretical part was focused on the modern intertemporal approach to external economic stability. A basic as well as a more advanced models of intertemporal approach have been developed. Theoretical aspects related to the cases of transition economies have been dealt with more in detail. A life-cycle model of transition economy (Mandel and Tomšík 2006) has been presented.

On the basis of all the theory reviewed and with consideration to the specifics of transition countries with important foreign direct investment inflows definition of external economic stability at the level of basic balance has been preferred. The dynamic problems with sustainability of this balance have been addressed and detailed analysis of various indicators of external economic balance of the Czech Republic have been carried out. Consequently an analysis of the evolution of those indicators and an econometric analysis based on VAR and cointegration techniques have been performed.

From the descriptive analysis of various potential indicators of external economic stability several important facts ought to be mentioned. The basic balance is in general balanced or in surplus. As for its components foreign direct investment is in surplus but fluctuates dramatically according to privatizations projects of the Czech government. But after a period of important privatizations the inflow of FDI tends to stabilize and the importance of reinvested earnings in this account becomes more significant. The outflow of foreign direct investment is very limited and relatively higher outflows are linked to the investment activity of Czech state owned electric power producer.

The second component of basic balance, current account balance, is consistently in deficit, however, its structure has changed importantly. The trade balance passed from critical deficits before monetary crises in 1997 to a surplus and the income balance from a small surplus to high deficits. Those deficits are linked to the passed foreign direct investment inflow and the worsening of the net international investment position. However, the econometric analysis suggests that the deficits of net international investment position are not currently as dangerous as they may seem to be. The cointegration models suggest that a deficit of net international investment position contributes rather to the surplus of current

account than to its deficits. This result may obviously be questioned and the coefficients may not be accurate enough due to the limited time series available for the estimation. However, it at least suggests that it is not as much threatening the external economic stability as might be thought on the basis of descriptive accounting analysis given the links between various components of the balance. Net international investment position deficit has for instance relatively high influence on real exports and more limited influence on income outflows. The analysis also suggests that the link between real imports and net international investment position may be mediated through exports. The imports intensity of exports is high but in relation to similar estimates e.g. in Mandel and Tomšík (2006) it is lower suggesting higher substitution of imports by domestic products in recent years.

An important determinant of external economic stability seems to be also the government budget balance. The theoretical model by Bussière (2004) suggests the reasons for non applicability of Ricardian equivalence of debt and taxes based on liquidity constraints and the econometric models confirm the relevance of government budget balance for current account balance (even though with some reserves). This result brings new insight into the issue of twin deficits seen it the case of the Czech Republic. Moreover government debt over past years increases dangerously the total foreign debt to its benchmark value of 40% of GDP. In my opinion high government deficits could potentially cause an unsustainable level of the external economic balance. Hopefully, with the entrance to the European Union and the linked necessity to fulfill Maastricht criteria government would be limited in fiscal expansion and therefore the external economic balance would not be endangered.

Other determinants seemed to be in balance or not directly threatening the external economic stability of the economy. The saving rates decreased from their levels in nineties but for past years remained constant, the share of reinvested earnings in income outflows declined also from their levels at the beginning of the transformation but remains constant over the last few years. Real exchange rate is insignificant for the development of the external balances which confirms that the exports are driven by the growth in productivity and therefore the real as well as nominal appreciation does not have a significantly negative impact on external economic stability.

The econometric estimations also suggest that the current growth is regarded by residents as permanent and as an indicator of future permanent growth.

To conclude, the descriptive analysis as well as econometric analysis confirmed the relevance of few important determinants and refused the anticipated relevance of others for which a larger time series or a panel analysis over several countries might be necessary. From all the analysis performed it seems that the Czech Republic is not in dangerous external economic imbalance. Especially the econometric analysis suggests that development of net international position deficit may not be as dangerous as considered by some authors. On the other hand it defines a potential threat which is represented by consistent government deficits.

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