Discussion Paper No. 05-51

International Capital Mobility and Current Account Targeting in Central and Eastern European Countries

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Abstract

The paper examines the degree of financial integration in five central and eastern European economies on the basis of saving-investment correlations. A comparison with eleven member states of the European monetary union shows that the countries under review have already reached a higher degree of integration in quantitative terms. Since this approach is sensitive to current account targeting policies, the paper uses econometric techniques to control for these kinds of policies indicating that the central and eastern European countries that suffered from current account crises in the past might have used fiscal policies to balance the current account.

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1 Introduction

In May 2004, the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia (hereafter: CEEC-5) joined the European Union (EU). Precondition for the accession was that the countries had met the political and economic criteria and adopted all policies and rules of the EU and to ensure their effective enforcement through appropriate administrative structures. Among these rules some require to remove all barriers that restrict the transfer of capital and services, since only the free flow of capital and services within the community makes it possible to take full advantage of the single market. Furthermore, the harmonization of financial market regulations has positive effects on monetary policy in an enlarged European Monetary Union (EMU), since different financial structures and levels of financial integration impede an efficient monetary policy by the European Central Bank (ECB). This not only endangers price level stability but also economic growth, since monetary shocks might have asymmetric effects on the economy in central and eastern European countries due to different structures and degrees of financial market integration. The effect of differences in the financial structure on the transmission of monetary impulses has already been topic of recent research. The papers of Cecchetti (2001), Jarocinsk (2004) and Schmitz (2004) however only focus on the effect of differences in financial structures across the EMU on the transmission of monetary shocks.

This paper represents an attempt to fill this gap and to measure the degree of financial market integration in the CEEC-5 and to compare their degree of integration with that of the EMU in order to find out if differences in the degree of international capital mobility might cause asymmetric responses to monetary shocks in an enlarged monetary union. The remainder of this paper is organized as follows. In *part 2*, we will present different measures of financial market integration, before we will use one of these indicators in *part 3* to measure the degree of capital mobility econometrically. Since current account policies affect the degree of financial market integration, we will analyse the extent to which these policies were used in the CEEC-5 and to what extent they have influenced the degree of international capital mobility in *part 4*. *Part 5* concludes.

2 Measuring Financial Market Integration

Financial market integration implies that all frictions have been removed that discriminate between economic agents in their access to and the investment of capital on the basis of their location (European Central Bank, 2003, p. 54). Based on this definition of integration three concepts can be distinguished to measure the degree of financial market integration.

Quantity-based indicators measure the degree of financial integration according to the volume of international transactions. Since these indicators only measure the degree of internationalization and not the degree of integration of financial markets,

indicators have to be used that analyse the efficiency of the financial sector, which depends upon the level of competition in financial markets. Such indicators base upon the law of one price and are called price indicators. According to these indicators, financial markets are perfectly integrated into the world capital market if nominal and real interest rate parity holds.[1] A further indicator that combines quantity-based indicators and price indicators is the Feldstein-Horioka test, which is named after Feldstein and Horioka (1980) who used it to measure the degree of international capital mobility of 16 OECD countries. The idea behind this indicator is that in closed economies domestic investment is limited by domestic savings. Saving and investment rates are hence expected to be highly correlated if financial markets are separated from the world capital market. In order to test their hypothesis, Feldstein and Horioka regressed the domestic saving rate on the domestic investment rate for a cross-section of 16 OECD countries averaged over the period from 1960 to 1974 (hereafter: aggregate savings regression).

$$(1)\ (I/Y)_i = \alpha + \beta\ (S/Y)_i + \varepsilon_i,$$

where i a country index, (I/Y) the domestic investment and (S/Y) the domestic saving rate, ε a random error term with zero mean and constant variance. The beta coefficient measures the degree of capital mobility and is also called Feldstein-Horioka coefficient. According to Feldstein and Horioka financial markets are perfectly integrated into the world capital market, if the Feldstein-Horioka coefficient is insignificantly different from zero. In this case, domestic investments do not depend on domestic savings, since they are completely financed by the world wide pool of capital. Financial markets are conversely perfectly separated from the world capital market, if the Feldstein-Horioka coefficient is one. In this case, domestic investments are completely financed by domestic savings and a drop of the domestic savings rate leads to a proportional decline of the domestic investment rate. Since Feldstein and Horioka got saving retention coefficients of 0.87 for gross and 0.93 for net domestic saving rates, they rejected the hypothesis of perfect capital mobility and concluded that

> "the evidence strongly contradicts the hypothesis of perfect capital mobility and indicates that most of incremental saving tends to remain in the country in which the saving is done" (Feldstein and Horioka, 1980, p. 321).

This conclusion sparked off a great discussion about the validity of the Feldstein-Horioka criterion to measure the degree of financial market integration. The

[1] Herrmann and Jochem (2003a and 2003b) recorded deviations from covered and uncovered interest rate parity in the Czech Republic, Hungary, Poland and the Slovak Republic. According to the covered and uncovered interest rate parity condition, the financial markets in these countries are thus not integrated into the European financial market.

criticism has mainly concentrated on the econometric techniques and the interpretation of the Feldstein-Horioka coefficient as indicator for degree of international capital mobility. Critics of the econometric techniques argue that the degree of international capital mobility is biased toward lower international capital mobility because of the endogenity of real interest rates and savings rates (Feldstein and Horioka, 1980; Harberger, 1980 and Murphy, 1984). Critics of the interpretation of the Feldstein-Horioka coefficient as the degree of international capital mobility argue that this coefficient does not measure the degree of international capital mobility, since domestic savings and investment rates are highly correlated even in case of perfectly integrated capital markets due to productivity and population effects, the existence of an intertemporal budget constraint and current account targeting policies of the government and the central bank (Artis and Bayoumi, 1990; Bayoumi, 1990; Coakley, Kulasi and Smith, 1995; Feldstein and Horioka, 1980; Sinn, 1992 and Summers, 1986). Taken this criticism into account and applying the Feldstein-Horioka test to other countries and periods however has not solved the Feldstein-Horioka paradox.

Buch (1999) was the first that used the Feldstein-Horioka approach to measure the degree of international capital mobility in central and eastern European countries. In her seminal paper on capital mobility and EU enlargement, she estimated the degree of financial integration for a panel of central and eastern European countries (Czech Republic, Estonia, Hungary, Poland and Slovenia). As benchmark she used three southern European countries (Greece, Portugal and Spain). Buch concluded that the central and eastern European countries have reached almost the same degree of capital mobility like the three southern European countries and hence

> "that membership in the EU was unlikely to boost capital market integration to a significant degree and to trigger huge capital inflows" (Buch, 1999, p. 28).

This paper extends the approach by Buch in three ways. First, we include the Slovak Republic and eleven member states of the EMU in the sample to compare the degree of capital mobility of the CEEC-5 with that of the Euro area. The advantage of this approach over that of Buch is that we can analyze if the CEEC-5 still have to further integrate into the Euro area financial market to ensure an efficient monetary policy in an enlarged monetary union. Second, we increase the sample size by the period from 1998 to 2003. This allows us to test the hypothesis of Buch that EU membership will not likely increase degree of capital mobility according to the Feldstein-Horioka criterion. Third and last, we analyze the effect of current account targeting policies on the degree of financial integration. These policies might have biased the degree of financial integration of the central and eastern European countries toward lower international capital mobility, since many governments

might have targeted the current account to prevent unsustainably large current account deficits.

3 Saving Rates, Investment Rates and the Current Account

The recession in the CEEC-5 at the beginning of the transformation period led to the decline of domestic investment and saving rates. Since mostly domestic saving rates dropped faster than domestic investment rates, the CEEC-5 faced a lack of domestic capital. This lack was financed by foreign capital, which increasingly flew into central and eastern European countries attracted by stable exchange rates and a great number of investment opportunities. Higher growth in the middle of the nineties further worsened the current account balance, because it often went hand in hand with higher investment rates. In most cases, these current account deficits could be financed by the import of foreign capital. This capital was pulled out of these countries as these economies slipped into recession and investor confidence in the sustainability of the exchange rate regime diminished. In particular, countries which attracted high volumes of short-term portfolio investments in the past were vulnerable to capital outflows and had to devalue their currency following high pressure on the exchange rate target of the central bank. These currency crises often entailed severe financial and economic crisis.

The countries reacted differently on these shocks some adopting even harder exchange rate regimes and some letting the exchange rate float without interventions. Similar to all countries was the adoption of savings programs that were targeted on reducing the current account deficit.

Czech Republic (see Figure 1a in the Appendix): After the economic recovery in 1992 and 1993, investment and saving rates increased. However, since saving rates did not rise as fast as investment rates, domestic investment had to be financed by foreign capital. Due to the import of capital the Czech Republic recorded current account deficits in the following years which peaked in 1996 and 1997 with a deficit of more than 12 percent. As these deficits became unsustainable, speculative attacks were launched which led to a currency and banking crisis and forced the Czech central bank to abandon its exchange rate target in May 1997. Due to a savings program of the Czech government, higher private saving and lower investment rates following the recession of the Czech economy, the deficit dropped to 6 percent in 1998 and 1999. As the economy recovered, investment rates rose again and caused a temporary rise of the current account deficit to 8 percent in 2000, until it could be reduced to 5 percent in 2002.

Hungary (see Figure 1b): The transition to a market-based economy started with a recession, which led to a decline of saving and investment rates. Since the saving rate dropped faster than investment rate, Hungary reported a current account deficit

of nearly 10 percent in 1993 and 1994. This deficit dropped to almost 5 percent after the government launched a savings program in 1995 and 1996 that increased domestic savings without influencing the investment rate. Due to lower saving rates in the succeeding years and constantly high investment rates the deficit rose again to more than 8 percent in 2000 until it could be reduced to less than 6 percent in 2003.

Poland (see Figure 1c): Due to a recession at the beginning of the transformation period saving and investment rates dropped significantly. Since the investment rate started to recover earlier than the savings rate, Poland recorded a current account deficit of more than 6 percent in 1993. This deficit dropped to less than 5 percent in 1995 due to higher domestic savings until it rose to almost 12 percent between 1997 and 1998 because of increasing domestic investments. Because of higher budget deficits between 1998 and 2001 aggregate savings decreased and foreign capital had to be imported to finance domestic investments. In 2000, the current account balance improved due to lower investment rates following a downturn of the Polish economy although aggregate savings decreased in this period as well. Due to constant saving and investment rates in the following years the current account stabilized at a deficit of less than 7 percent.

Slovak Republic (see Figure 1d): After a large current account deficit in 1993, a decline of the domestic investment rate and a rise of the saving rate led to an almost balanced current account. Since then the saving rate remained relatively stable, whereas the investment rate rose to 35 percent between 1996 and 1998 due to a rise of private and public investment. The current account deficit consequently rose to 13 percent in 1996 and peaked in 1998 with a deficit of 14 percent. These deficits were mainly financed by short-term foreign debt, which made the country vulnerable for speculative attacks from foreign investors. These attacks together with a rapid outflow of foreign capital led to a currency and current account crisis in 1998, which forced the Slovak central bank to give up its exchange rate target. After the crisis, the government launched a program to increase public savings. However, lower private saving rates more than compensated the public savings increase and aggregate savings further decreased. Only because of declining investment rates, the current account deficit could be reduced to nearly 7 percent in 2000. This deficit did not last for a long time. Due to an investment boom the current account deficit rose again to more than 13 percent until it could be lowered to 5 percent in 2003 as the boom came to an end.

Slovenia (see Figure 1e): The saving and investment rates remained relatively stable in relation to the other CEEC-5 countries. In 1991, Slovenia recorded a current account surplus, which however soon evolved into a current account deficit due to lower saving and higher investment rates. At the peak of the investment boom in 1999 and 2000, the deficit reached almost 8 percent. Due to an economic downturn

investment rates declined and saving rates rose leading to a current account deficit of less than 4 percent in 2003.

3.1 Saving and Investment Correlations in the CEEC-5

The analysis of the development of saving and investment rates in the preceding section has shown that domestic investment rates did not depend on the domestic saving rate between 1993 and 2003, since the CEEC-5 increasingly imported foreign capital to partly finance domestic investments. For that reason, the financial markets of the CEEC-5 are neither perfectly integrated nor perfectly separated from the world capital market according to the Feldstein-Horioka criterion. To measure to what extent the financial market integration of the CEEC-5 are integrated in the world capital market, correlation coefficients between domestic saving and investment rates are analyzed.

Since in a world of immobile capital domestic investments are completely financed by domestic savings, saving rates and investment rates have to be perfectly correlated. The correlation coefficient therefore has to be one in perfectly separated financial markets. If the domestic financial market is however perfectly integrated into the world capital market, domestic investments are completely financed by the worldwide pool of capital and do not rely on domestic savings. The correlation coefficient is then expected to be zero in perfectly integrated markets.

Table 1: Correlation Coefficients of Domestic Saving and Investment Rates

	Czech Republic	Hungary	Poland	Slovak Republic	Slovenia
S/Y and I/Y	-0.02	0.68	0.86	0.29	0.42

Source: IFS (2005), own calculations

The correlation coefficients are presented in Table 1. According to these coefficients, the Czech financial market is almost perfectly integrated into the world capital market, since the correlation coefficient between the Czech saving and investment rate is zero. The financial markets of Poland, Hungary, the Slovak Republic and Slovenia conversely seem to be still considerably separated from the world capital market indicated by a high correlation coefficient between saving and investment rates. In particular, the degree of financial market integration in Poland seems to be very low. The correlation coefficient between the Polish saving and investment rate is 0.86 indicating a high degree of financial market segmentation. However, we caution against taking these results seriously, since correlation does not imply causation. For that reason, we applied other techniques in the next section to measure the degree of financial integration econometrically.

3.2 International Capital Mobility in the CEEC-5: The Feldstein-Horioka Approach

In order to measure the degree of financial market integration in the CEEC-5 into the world capital market econometrically, we use the Feldstein-Horioka approach. Due to the lack of long time-series data the degree of financial integration is estimated only for the group and not for each country separately. This panel approach has the advantage that information from cross-sectional and time-series data is used to estimate the relationship between saving and investment rates. The time-series properties could then be interpreted as capturing short-run dynamics of savings and investments, while the cross-sectional estimates reflect the long-run relationship between savings and investment rates (Obstfeld, 1995). The panel has been estimated with Original-Least Squares (OLS) which is the standard estimator in the literature on the Feldstein-Horioka approach.[2]

To compare the degree of capital mobility with the EMU member states, we also analyze the saving-investment correlations of Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain (hereafter: EMU-11).[3] If the Feldstein-Horioka coefficient of these countries is smaller than in central and eastern Europe, the EMU-11 are more integrated into the world capital market. In an enlarged EMU, monetary shocks might then cause asymmetric reactions in the CEEC-5.

Equation (1) was estimated for annual data for the reform period (1989 to 2003) and for the entire period (1980 to 2003) (hereafter aggregate savings regression). In order to remove serial correlation from the residuals, autoregressive terms were used as additional regressors. To account for unobserved time invariant differences for each cross-sectional unit, the equation was furthermore estimated with country specific dummy variables. The regression results are presented in Table 2 on page 10. The regressions confirm the conclusions we draw from the descriptive analysis of saving and investment rates, since the Feldstein-Horioka coefficient is 0.41 (with a standard error of 0.05) over the entire and 0.32 (0.06) over the reform period indicating that the financial markets of the CEEC-5 are neither perfectly integrated

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[2] See Coakley et al. (1998) for a survey article on the literature about the Feldstein-Horioka approach and capital mobility.

[3] Luxembourg has been excluded from the sample because it constitutes an outlier due to its characteristics as a small country with a huge financial market place. Investment rates have been calculated by dividing the sum of gross fixed capital formation and changes in inventories by GDP. Saving rates have been calculated according to the current account identity as the sum of gross investment and the balance of the current account divided by GDP. Due to a lack of data saving and investment rates could have been calculated for the Czech Republic and the Slovak Republic for the period between 1993 and 2002 and 1993-2003 respectively as well as for Slovenia for the period between 1990 to 2003. Data on Polish and Hungarian saving and investment rates were available for the entire period. All data have been taken from IFS (2005).

into nor perfectly separated from the world capital market. A Feldstein-Horioka coefficient of 0.41 means that 41 percent of domestic investments is financed by domestic savings. To analyze if the degree of international capital mobility increased between 1980 and 2003, Wald test were used. These tests do not reject the hypothesis that the coefficients are significantly different. The degree of capital mobility in central and eastern Europe thus seems to have significantly increased during the reform period. [4]

To find out if the CEEC-5 have already reached the same degree of international capital mobility as the EMU member countries, we ran the Feldstein-Horioka regression for the EMU-11 as well. The regression results are also presented in Table 2. The saving retention coefficient of the EMU-11 for the entire period is 0.55 (with a standard error of 0.05) and that for the reform period 0.47 (0.05). These estimates are close to the coefficients Buch (1999) estimated for southern Europe. To find out if the coefficients over the entire and the reform period are significantly different, Wald Tests were performed. These tests reject the hypothesis that the coefficients are not significantly different. The degree of international capital mobility in the EMU-11 thus seems to have increased in the reform period. To find out if the CEEC-5 are more integrated into the world capital market than the EMU-11, the same tests were used. These tests do not reject the hypothesis that the coefficients over the total and the reform period are significantly different from each other. The degree of financial integration thus seems to be higher in the CEEC-5 than in the EMU-11.

The higher degree of international capital mobility in the EMU-11 in the reform period might be attributed to the removal of barriers that restricted the cross-border transfer of capital in the period before 1989. In the reform period, the EU finished the creation of the single market by the removal of capital and service controls within the EU. It might also explain the higher degree of capital mobility in the CEEC-5, since in 1998 the accession process to the EU started and was almost finished, during which the countries had to remove all existing controls on capital and services to meet the accession criteria. That the CEEC-5 have already reached a higher degree of financial integration in the world capital market than the EMU-11 indicate that the CEEC-5 used the accession process not only for removing barriers of capital toward the European, but also toward the world capital market, while the European countries seem to have more focused on the removal of frictions within the monetary union. Another reason is the need for capital in order to finance the transformation from a central-planned to a market-based economy in the CEEC-5. Due to the underdevelopment of the financial markets in these countries and the small capital stock these countries have to import foreign capital to finance domestic investment. The EMU-11 conversely have a well developed financial market and a

[4] Test and regression results that have not been reported are available from the authors at request.

larger capital stock and hence rely less on the import of foreign capital to finance domestic investment projects than the CEEC-5.[5]

A problem with panel data regressions is that the time-series used might be non-stationary, since the regression of non-stationary variables on another non-stationary variable leads to spurious results when these series are not co-integrated (Granger and Newbold, 1974). In this case, the results obtained from the panel regression above would be biased and any inference about the degree of financial integration meaningless. Earlier results however suggest that the assumption of non-stationarity of savings and investment rates cannot be dismissed a priori (Coakley et al, 1996). Because of the small sample period, tests on the stationarity of the time-series could however not be performed. Following Buch (1999), we estimated equation (1) therefore in first differences as well. The regression results are presented at the bottom of Table 2. As expected taking differences worsens the fit of the regression. The R^2 of the regression over the entire and the reform period drops considerably. The Feldstein-Horioka coefficients of the total and the CEEC-5 sample regressions are however still highly significant and insignificantly different from the coefficients of the panel regression in levels. For comparison purposes, we estimated equation (1) in first differences for the EMU-11 as well. The regression results are also reported at the bottom of Table 2. The Feldstein-Horioka coefficients are slightly higher than those estimated in levels. Wald tests however reject the hypotheses that the coefficients of the first-difference regression are significantly different from the coefficients in the levels regression.

To summarize, panel data regressions over the entire period and the reform period in levels as well as first differences indicate that the degree of capital mobility increased between 1980 and 2003 both in the CEEC-5 and in the EMU-11. Hypothesis tests furthermore reveal that the degree of international capital mobility is already higher in the CEEC-5 than in the EMU-11. These results might be explained with the need for foreign capital to finance domestic investment projects as well as the removal capital controls and further barriers that limit the import and export of capital following the accession to the OECD and the preparation for the accession to the EU. They also confirm the hypothesis of Buch (1999) that the central and eastern European countries have already reached the same degree of integration into the world capital market like the member states of the EU and that

[5] The effect of country size on the degree of international capital mobility has been analyzed by Harberger (2980) and Murphy (1984). They have divided the Feldstein and Horioka (1980) sample according to country size into two different subgroups to find out if the degree of capital mobility is related to the size of the country. Their results indicate that smaller countries have a significantly higher Feldstein-Horioka coefficient than the group of large countries. They interpret this as evidence for the existence of a country effect that biases the degree of international capital mobility.

Table 2: Domestic Saving and Investment Correlations

Equation (5) was estimated for annual data for the reform period (1989 to 2003) and for the entire period (1980 to 2003) as OLS panel regression with cross-section weights. The regression was estimated with autoregressive terms (AR) to remove serial correlation from the residuals and with country specific dummy variables to account for unobserved time-invariant differences for each cross-sectional unit. (S/Y) is the aggregate saving retention coefficient. CZ, HU, PL, SLK and SL denote the individual country intercepts of the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia.

	CEEC-5		Euro Area	
	1980-2003[1]	1989-2003	1980-2003[2]	1989-2003
	Levels			
S/Y	0.41***	0.32***	0.55***	0.47***
	(0.05)	(0.06)	(0.05)	(0.05)
CZ	0.21***	0.23***		
	(0.01)	(0.01)		
HU	0.16***	0.18***		
	(0.01)	(0.01)		
PL	0.15***	0.16***		
	(0.01)	(0.01)		
SLK	0.21***	0.23***		
	(0.02)	(0.02)		
SL	0.16***	0.18***		
	(0.01)	(0.01		
AR(1)	0.69***	0.81***	1.03***	1.12***
	(0.10)	(0.12)	(0.05)	(0.08)
AR(2)	-0.18**	-0.31***	-0.25***	-0.41***
	(0.10)	(0.11)	(0.06)	(0.08)
H_0: (S/Y) = 1	127.77***	105.24***	73.09***	98.41***
Obs.	72	58	240	163
R^2	0.80	0.82	0.88	0.88
DW	1.83	2.08	1.77	1.85
	First Difference			
D(S/Y)	0.41***	0.36***	0.56***	0.52***
	(0.05)	(0.06)	(0.05)	(0.05)
H_0: (S/Y) = 1	96.75***	85.60***	61.83***	65.47***
Obs.	67	55	229	163
R^2	0.41	0.44	0.52	0.44
DW	2.00	2.21	1.70	1.90

[1] ***,**,* indicate significance at the 1; 5 and 10 percent level, standard errors in parenthesis

[2] The intercept coefficients of the EMU-11 have not been reported but are available at request.

Source: IFS (2005), own calculations

the accession process would likely not boost capital market integration to a large extent and to trigger huge capital inflows (Buch, 1999, p. 28).

Problematic is that the panel approach only measures the degree of capital mobility for a group of countries and not for each country separately. The degree of capital mobility might therefore have been biased by a small number of highly integrated countries even though the most countries in the panel are almost separated from the world capital market. The different correlation coefficients indicate that this effect might be responsible for the high degree of financial market integration in the CEEC-5. Another problem of the Feldstein-Horioka approach is that the estimates of the Feldstein-Horioka coefficients might have been biased by current account targeting policies of the governments in the CEEC-5.

4 The Feldstein-Horioka Approach and Current Account Targeting

As noted in the second section, the approach by Feldstein and Horioka (1980) to measure the degree of financial integration is criticized, since it can indicate a low degree of international capital mobility even if financial markets are perfectly integrated due to current account policies of the government. To make the relationship between fiscal policies and the current account clear, we will start with the current account identity according to which the current account balance is equal to the difference between domestic savings and domestic investments.

$$(2)\ CA = S - I,$$

where CA is the current account balance, S domestic savings and I domestic investment. Since domestic savings can be decomposed into private and public savings, the identity above can be re-written as:

$$(3)\ CA = S_G + S_P - I,$$

where I is private investment, S_P private and S_G public savings. Since the amount of public savings depends upon the revenues and expenditures of the government, equation (3) can be rearranged to:

$$(4)\ CA = (T - G) + (S_P - I),$$

where T is government revenues and G government expenditures. As illustrated by equation (4) the fiscal budget might act as adjustment variable, since the government can balance the current account by adjusting its budget to the difference between private savings and investments. If a country has higher investment than private

savings rates, the government has to increase its savings by reducing government expenditures and/or by raising taxes to balance the current account. If domestic savings on the contrary exceed domestic investments, the government has toincrease its debt to balance the current account. For that reason, the correlation of the spread between private savings and investments and the fiscal budget is expected to be negative in perfectly integrated capital markets, if the government has targeted the current account.[6]

The correlation between the fiscal budget and the spread between private savings and investment however might also be negative, even if the government has not targeted the current account. Feldstein and Bachetta (1989) addressed this problem in their second paper on international capital mobility and argued that the negative correlation might have also been caused by the crowding out or crowding in of private investment in a world of immobile capital. In such a world, the domestic interest rate is completely determined by the domestic demand for and the supply of capital. An increase of government expenditures consequently causes the domestic interest rate to rise and to crowd out domestic investments, whereas a reduction of government expenditures causes the interest rate to decrease and to crowd in new investments. Thus even in a world of perfectly immobile capital the government budget and the difference between private saving and investment can be negatively correlated.

To find out whether the regression results of the panel regressions above are biased by fiscal policies, we have regressed the private and the public saving rate on the domestic investment rate for the period between 1980 and 2003 according to Feldstein and Bachetta (hereafter private savings regression).[7]

$$(5)\ (I/Y)_{it} = \alpha_i + \beta_1 (S_P/Y)_{it} + \beta_2 (S_G/Y)_{it} + \varepsilon_{it},$$

where i is a country and t a time index. (S_P/Y) is the private saving rate, (S_G/Y) the public saving rate defined as the difference between public revenues and expenditures and ε is a random error term with zero mean and constant variance. To allow for time-invariant differences between each cross-section unit, equation (5) was estimated with country-specific dummy variables. Autoregressive terms were

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[6] Summers (1986) tested this relationship by regressing the difference between savings and investments on the government deficit to prove that the Feldstein and Horioka paradox can be explained by current account targeting. He interpreted his results as evidence for this policy and criticized the interpretation of the Feldstein-Horioka coefficient as indicator of the degree of international capital mobility.

[7] Artis and Bayoumi (1990) have estimated monetary and fiscal reaction functions to find out if the current account was policy target of the government and the central bank. Their results suggest that the current account has been targeted by the central bank and not by governments and hence that states mainly use monetary instead of fiscal instruments to influence the current account.

used to remove autocorrelation. Since some of the CEEC-5 countries launched government savings programs to reduce the current account deficit, we expect the public saving retention coefficient to be statistically significant and the private saving retention coefficient to be significantly lower in this regression than in the aggregate savings regression. This indicates that fiscal policies have significantly biased the degree of capital mobility in the CEEC-5 toward lower capital mobility than in the aggregate savings regression. The regression results are presented in Table 3 on page 14.

The regression model fits the data very well and all variables are as expected highly significant. The private saving retention coefficient over the entire period is 0.35 (with a standard error of 0.06) and that of the public sector 0.45 (0.12). For the reform period, the respective coefficient for the private sector is 0.32 (0.14) and 0.66 (0.24) for the public sector. Since the private savings retention coefficients are smaller than in the aggregate savings regressions, the degree of capital mobility seems to have been biased by fiscal policies of the governments in the CEEC-5. In particular, in the reform period the development of the domestic investment rate seems to have been significantly influenced by the development of the public savings rate. The public saving retention coefficient in this period almost adds up to unity with the private saving retention coefficient indicating that the government has almost perfectly offset the gap between private savings and investments. Wald tests however do not reject the hypothesis that the private saving retention coefficients in the aggregate and the private savings regression are identical. The degree of international capital mobility of the CEEC-5 thus does not seem to have been significantly biased by government policies although public saving retention coefficients are highly significant.

The results of the regression for the EMU-11 also indicate that the degree of financial market integration has been biased toward lower capital mobility by government policies, since the Feldstein-Horioka coefficients of the aggregate savings regressions are higher than the coefficients in the private savings regression. The respective coefficient for the private sector is 0.52 (with a standard error of 0.05) for the entire period and 0.44 (0.05) for the reform period. The respective public saving retention coefficients are 0.59 (0.07) and 0.48 (0.06). Wald tests however reject the hypothesis that the coefficients of the private savings regression are significantly different from those in the aggregate savings regression. These tests thus again indicate that the degree of international capital mobility has not significantly been biased by government policies although public savings rates are significantly correlated to the domestic investment rate.

Following Buch (1999), we estimated equation (5) also in first differences to take account of the potential non-stationarity of the time-series. The regression results are

Table 3: Private and Public Saving and Investment Correlations

Equation (5) was estimated for annual data for the reform period (1989 to 2003) and for the entire period (1980 to 2003) as OLS panel regression with cross-section weights. The regression was estimated with autoregressive terms (AR) to remove serial correlation from the residuals and with country specific dummy variables to account for unobserved time invariant differences for each cross-sectional unit. (S_P/Y) and (S_G/Y) are the private and public saving retention coefficients. CZ, HU, PL, SLK and SL denote the individual country intercepts of the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia.

	CEEC-5		Euro Area	
	1980 to 2003[1]	1989 to 2003	1980 to 2003[2]	1989 to 2003
	Levels			
S_P/Y	0.35***	0.32**	0.52***	0.44***
	(0.06)	(0.14)	(0.05)	(0.05)
S_G/Y	0.45***	0.66***	0.59***	0.48***
	(0.12)	(0.24)	(0.07)	(0.06)
CZ	0.22***	0.24***		
	(0.01)	(0.03)		
HU	0.17***	0.19***		
	(0.01)	(0.03)		
PL	0.19***	0.20***		
	(0.01)	(0.02)		
SLK	0.21***	0.23***		
	(0.02)	(0.03)		
SL	0.17***	0.18***		
	(0.01)	(0.02)		
AR(1)	0.80***	0.81***	1.01***	1.09***
	(0.14)	(0.15)	(0.06)	(0.09)
AR(2)	-0.41***	-0.44***	0.23***	-0.38***
	(0.13)	(0.13)	(0.06)	(0.08)
H_0: (S_P/Y) = 1	105.79***	21.96***	70.66***	97.62***
Obs.	53	44	209	132
R^2	0.74	0.72	0.88	0.89
DW	1.99	2.23	1.86	1.97
	First Difference			
D(S_P/Y)	0.23*	0.21	0.55***	0.49***
	(0.11)	(0.13)	(0.05)	(0.06)
D(S_G/Y)	0.40**	0.53**	0.64***	0.57***
	(0.15)	(0.21)	(0.07)	(0.06)
H_0: D(S_P/Y) = 1	41.25***	34.27***	56.26***	66.15***
Obs.	59	48	198	132
R^2	0.13	0.12	0.55	0.49
DW	1.79	1.89	1.82	2.14

[1] ***,**,* indicate significance at the 1; 5 and 10 percent level, standard errors in parenthesis

[2] Luxembourg was excluded from the regression due to a lack of data about public savings. Data abou public savings for the period between 1999 and 2003 were not available for Austria, France, Germany, Greece and Portugal. The intercept coefficients of the EMU-11 have not been reported but are available at request.

Source: IFS (2005), own calculations

presented at the bottom of Table 3. As for the aggregate savings regression taking differences worsened the fit of the regression. The Feldstein-Horioka coefficients of the entire and the reform period for the CEEC-5 and the EMU-11 are however still (weakly) significant. Wald tests reject the hypothesis that the private and publicsaving retention coefficients for the first-difference regression are significantly different from the coefficients in the levels-regression.

To summarize, neither the private savings regression for the CEEC-5 nor for the EMU-11 indicate that the degree of capital market integration was significantly biased by fiscal policies between 1980 and 2003. The significance of the public saving retention coefficients however also indicates that the public saving rate was correlated to the investment rate. This however cannot be taken as evidence for or against current account targeting policies of the government, since significant public saving retention coefficients are both consistent with a crowding out of private investments in case of low capital mobility and current account policies in case of high capital mobility. The private savings approach is hence appropriate to control for the influence of fiscal policies on the degree of international capital mobility, but inappropriate to find out if governments targeted the current account. We consequently have to apply other econometric techniques to analyze if the governments in central and eastern Europe used fiscal policies to balance the current account.

5 Current Account Targeting in the CEEC-5

If governments systematically adjust revenues and expenditures to the difference between private savings and investments to balance the current account, a country cannot infinitely run current account deficits or current account surpluses. For that reason, if the governments in the CEEC-5 successfully targeted the current account between 1980 and 2003, the current account time-series cannot be non-stationary. This hypothesis can be tested by analyzing the statistical properties of the current account time-series of the CEEC-5.

To do the test, we first generated the current account series according to equation (2) as the difference between the domestic savings and the domestic investment rate. Then we performed ADF tests of these series to test for the existence of a unit root. If these tests indicate that the current account series are non-stationary, governments did not target the current account. Table 4 presents the results of these tests for the period between 1980 and 2003.

The ADF tests come to different conclusions about the influence of the government on the current account. While the ADF tests of the Polish and the Hungarian current account indicate that these series are non-stationary, the tests of the Czech, the Slovakian and the Slovenian current account balance indicate that these series are stationary. These results have two different implications: First, the non-stationarity

of the Polish and the Hungarian current account series indicates that the governments in these countries did not target the current account.

Table 4: ADF Tests of the Current Account Balance

	Level		First Differences		Degree of
	Specification[1]	t-value[2]	Specification	t-value	Integration
Czech Republic	0C1	-3.33**	0C1	-2.84*	I(0)
Hungary	0C0	-1.66	0C0	-4.82***	I(1)
Poland	0C0	-1,51	0C0	-4.27***	I(1)
Slovak Republic	0C1	-3.36**	0C1	-2.83*	I(0)
Slovenia	0C0	-2.73*	0C0	-7.86***	I(0)

[1] Trend, constant, lag length

[2] ***,**,* indicate significance at the 1; 5 and 10 percent level

Sample Period: 1993 to 2002 for the Czech Republic, 1980 to 2003 for Hungary and Poland, 1993 to 2003 for the Slovak Republic and 1991 to 2003 for Slovenia

Source: IFS (2005), own calculations

Second, the stationarity of the current account series in the Czech Republic, the Slovak Republic and Slovenia indicates that the governments in these countries might have adopted current account targeting policies to balance the current account. It has however to be noted that the current account can also be stationary due to changes in the private savings rate and the investment rate. A stationary current account hence cannot be taken as evidence for current account targeting policies in these countries. The ADF results however might be interpreted as indication that these policies might have been used in these countries to prevent unsustainable current account balances. They furthermore do not contradict our observations we made in *part 3*, since the Czech and the Slovak Republic launched government saving programs after the currency crises in 1997 and 1998 to reduce the current account deficit. The test results for Hungary and Slovenia are more difficult to interpret, since the Slovenian current account is stationary although no current account targeting policies have been observed in *part 3*. The stationarity of the current account might have however also been caused by changes in the domestic private savings and investment rate. The ADF result for the Slovenian current account therefore does not contradict our observations at the beginning. Only the test result for Hungary is contradicting. Since the Hungarian government adopted savings programs in 1995 and 1996 to reduce the current account deficit, we would

expect the Hungarian current account series to be stationary. The ADF test results however indicate the opposite. This might be interpreted as evidence against the adoption of current policies or at least as evidence for the inability of the Hungarian government to sustainably influence the current account balance.

To check the robustness of these results, we also ran Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Tests (Kwiatkowski et al., 1992). This test differs from the ADF test in that it tests the null hypothesis that the series is stationary, whereas the ADF test assumes that the series is non-stationary. The test results confirm the ADF test results for the Czech and the Slovak Republic as well as Slovenia. For Hungary and Poland the KPSS test however comes to different conclusions about the stationarity of the current account series. This might indicate that the unit root test results are not robust and hence have to be interpreted with caution. The small sample period for which data about saving and investment rates are available might be a reason for this. It might also explain the conflicting result we got for the Hungarian current account balance.

6 Conclusions

The integration of financial markets into the world capital market is important for economic growth in central and eastern European countries, since the access to foreign capital increases the number of investments and entails the transfer of technology and know-how through foreign direct investment. Financial market integration is furthermore necessary for an efficient monetary policy in an enlarged monetary union, since different degrees of financial market integration cause different reactions on monetary shocks. The motivation of this study was to measure this degree of integration.

According to the analysis of saving and investments correlations neither the CEEC-5 not the EMU-11 are perfectly integrated into the world capital market. Both country groups however could significantly increase the degree of international capital mobility between 1980 and 2003. These developments can be explained by the removal of capital controls and further barriers that limit the import and export of capital following the accession to the OECD and the preparation for the accession to the EU. The underdevelopment of financial markets in the CEEC-5 as well as the demand for foreign capital to finance domestic investment projects might have also driven these results.

The empirical analysis has furthermore shown that potential asymmetric responses to monetary shocks cannot be expected in an enlarged EMU due to a lower degree of financial market integration in the CEEC-5, since the central and eastern European countries have already reached a higher degree of financial integration in quantitative terms than the EMU-11.

Since the CEEC-5 experienced high current account deficits between 1980 and 2003, many countries adopted government savings programs to reduce the current account deficit. These policies might have biased the degree of international capital mobility. To control for these policies, we estimated the Feldstein-Horioka equation also with private and public savings rates. The results indicate that the degree of capital mobility has not been significantly biased by fiscal policies. They however also reveal that government savings are significantly correlated to the domestic investment rate. Since the standard Feldstein-Horioka approach is not suitable for detecting current account targeting policies in the CEEC-5, we tested the statistical properties of the current account time-series on the basis of unit root tests. These tests reveal that in particular those CEEC-5 countries targeted the current account that suffered from current account crises in the past. Robustness checks and the small sample period however indicate that the results of these tests have been taken with caution and cannot be interpreted as evidence but rather as indication for the adoption of current account targeting policies in these countries.

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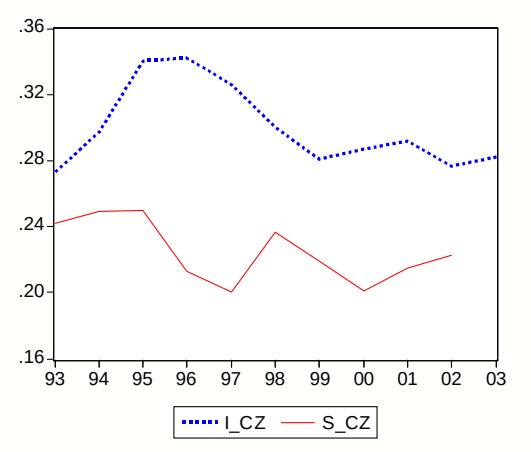
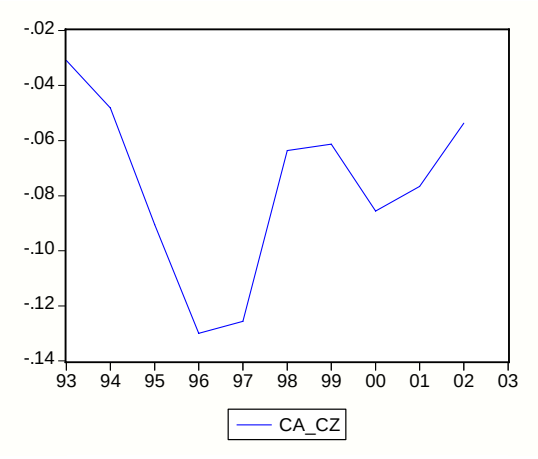
Appendix

Figure 1: Saving Rates, Investment Rates and the Current Account

a) Czech Republic





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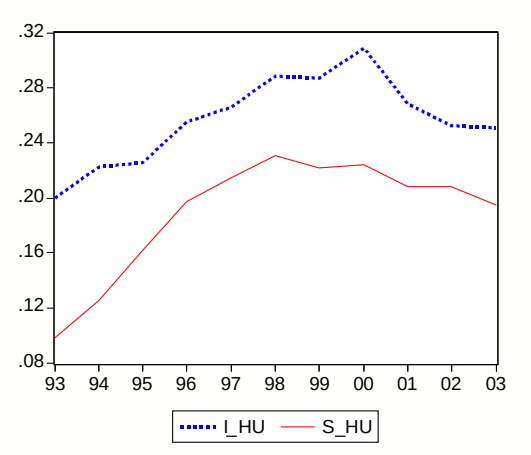
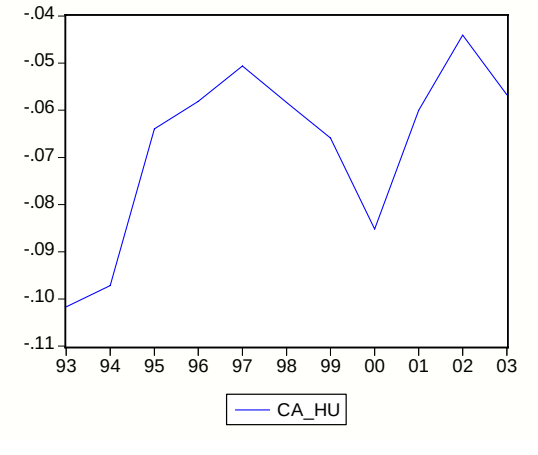
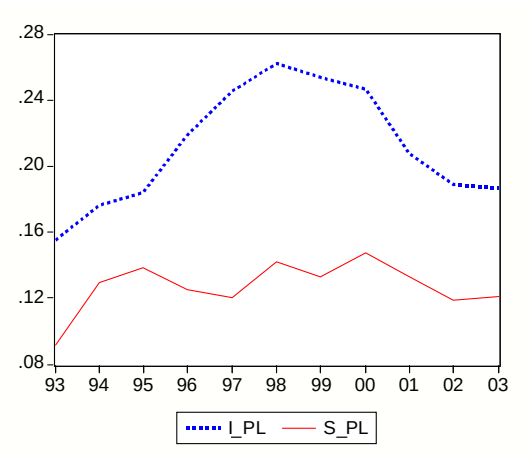
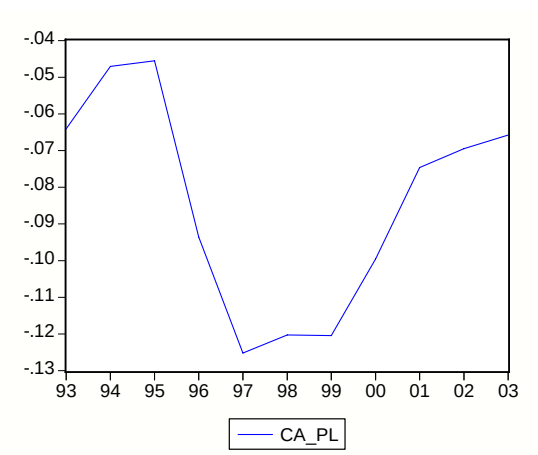


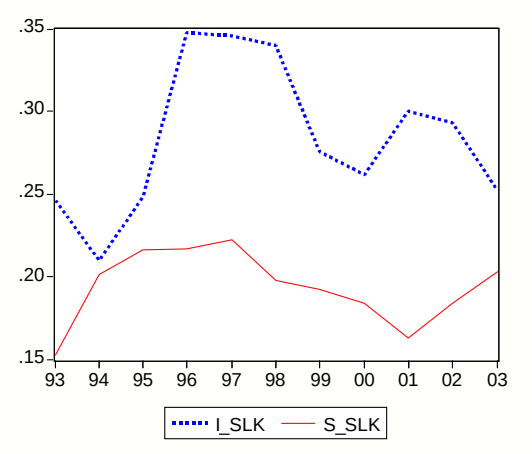


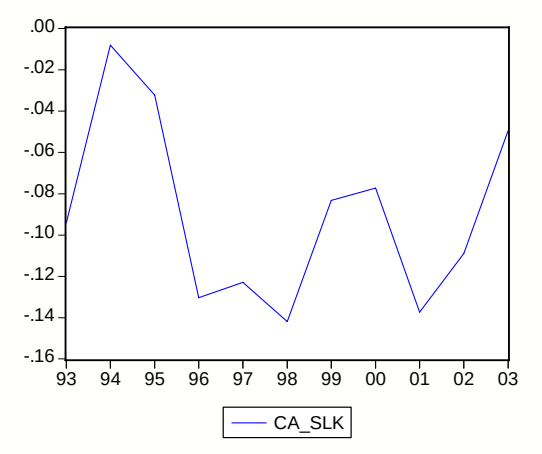
c) Poland





d) Slovak Republic





e) Slovenia