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**Working Paper**

## Capital Mobility and EU Enlargement

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Kiel Working Paper No. 908

## **Capital Mobility and EU Enlargement**

by

Claudia M. Buch

February 1999

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### Abstract\*

The EU has recently entered accession talks with five transition economies of eastern Europe. Membership in the EU would require *inter alia* the full liberalization of capital flows. This paper provides empirical evidence on the openness towards foreign capital that the accession states have attained so far on the basis of the correlation between domestic saving and investment. A comparison with the southern members of the EU shows that the countries under review have reached a similar degree of integration in quantitative terms. Yet, further adjustment in qualitative terms, i.e., in the structure of capital flows, can be expected as the process of accession proceeds.

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## Contents

1 Motivation.....	4
2 Measuring Capital Mobility .....	5
3 Degree of Integration .....	9
3.1 Liberalization of Capital Flows.....	10
3.2 Stylized Facts .....	11
3.3 Saving Investment Correlations .....	16
3.4 Alternative Measures.....	22
4 Impact of EU Membership.....	23
5 Conclusions .....	27
6 References.....	29

## Tables

Table 1 — Correlation Between Saving and Investment (Pooled Data) 1980–1997.....	17
Table 2 — ADF-Tests on Unit Root in Saving and Investment Rate .....	20
Table 3 — Correlation Between Saving and Investment (Time Series Data) 1971–1997.....	21
Table 4 — ADF-Tests on Unit Root in the Current Account.....	23
Table 5 — Capital Inflows Pre- and Post-Accession to the EU 1975–1997.....	25
Table 6 — Capital Inflows in the Transition Economies 1993–1997 .....	27

## Graphs

Graph 1 — Saving and Investment in Relation to GDP 1970–1997.....	12
Graph 2 — Current Account Balances in Relation to GDP 1970–1997 .....	14

## 1 Motivation

In spring 1998, the European Union (EU) has entered accession talks with the five most advanced reform states of central and eastern Europe, i.e., the Czech Republic, Estonia, Hungary, Poland, and Slovenia. The process of accession and the intended integration into the Single Market mark important milestones in the reform process of these countries. Membership in the EU requires inter alia the participation in the Single Capital Market. Notwithstanding the fact that liberalization has already proceeded quite far in the aforementioned countries, the new members will eventually have to abolish remaining barriers to the free flow of capital, including entry barriers for foreign financial institutions.

This process of integration takes place in an environment in which the benefits of free capital flows are increasingly being challenged. Not least as a response to the recent financial crises in Asia and Russia, which have spilled over into a number of other emerging markets, controls on capital flows are being advocated frequently as a means to shield nascent financial systems from adverse external shocks.<sup>1</sup> Potential lessons from these episodes are urgent particularly for the transition economies of central and eastern Europe.

At the same time, fairly little econometric evidence is available concerning the actual degree of integration into international capital flows that these countries have attained so far. Most papers on capital market integration deal with the implications of increased capital flows for economic policy.<sup>2</sup> A recent paper by Claessens et al. (1998) looks at the determinants of different types of capital flows for a panel of 21 transition economies in the years 1992-1996. The authors find that the degree to which reforms have been implemented, proximity to the EU in institutional terms, and changes in the levels of official reserves are major determinants of capital inflows. External (push) factors such as international interest rates, in contrast, tend not to enter with the expected sign, suggesting that a stock adjustment process has taken place mainly.

The present paper provides an assessment of the degree of integration by looking at the correlation between domestic saving and investment. It compares evidence from eastern Europe to that from the southern members of the EU. Its main result is that, in quantitative terms, the two groups of countries show a similar de-

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<sup>1</sup> BIS (1998: 187), Chote (1998: 29), and *The Economist* (1998) summarize the discussion.

<sup>2</sup> See, for instance, Calvo et al. (1995), Oblath (1998) and Siklos (1996) for the case of Hungary, Gomulka (1998) and Durjasz/Kokoszczynski (1998) for Poland, or Mervart (1995) for the Czech Republic.

gree of openness to foreign capital. In qualitative terms, i.e., with regard to the structure of capital flows, the two sets of countries still differ, and a further adjustment in the structure of capital flows can be expected as the process of accession to the EU proceeds.

The following *second* part discusses alternative measures of capital mobility. Part *three* presents empirical evidence on the correlation between domestic saving and investment for the potential new members, using data for three southern members of the EU as a benchmark. Part *four* looks at the likely impact of EU membership and argues that standard measures of integration should be supplemented by qualitative indicators which take the structure of capital flows into account. Part *five* concludes.

## **2 Measuring Capital Mobility**

Tests of the degree of capital mobility can be based on price or quantity indicators. While the former make use of the fact that in integrated financial markets rates of return on identical financial assets must be the same, the latter are based on the notion that in integrated financial markets domestic investment should not be constrained by the supply of domestic savings (Feldstein and Horioka 1980). It is a relatively common finding in the empirical literature that price measures show a greater degree of integration than quantity measures (Bayoumi 1998). One explanation for this dichotomy is that two different time horizons are applied. While interest parity tests are typically based on return data for relatively short-term financial assets, quantity conditions look at the intertemporal allocation of capital and are of a decidedly more long-term nature.

An alternative test of the degree of capital mobility uses the fact that the assumption of international mobility of capital implies that consumers can smoothen consumption over time by borrowing and lending on (international) capital markets. Hence, tests on the correlation of consumption and net domestic output can be used to assess the degree of capital mobility. Like tests on saving investment correlations, these approaches tend to show lower degrees of capital mobility than interest parity conditions (Bayoumi 1998). Shibata and Shintani (1998) show that if capital is mobile, changes in (private) consumption should be independent from changes in net output, defined as gross domestic product minus government consumption and domestic investment. They find that for the 1950s through the early 1990s, a sample of 11 OECD-countries can be divided into two sup-groups of high and low capital mobility.

The single most important problem with respect to the use of price measures of integration in the present context is the lack of international markets for the central European currencies. Hence, data on offshore interest rates and on identical foreign and domestic assets are not available. Moreover, long-run time series for forward rates of the eastern European currencies could not be obtained. Hence, the following analysis was confined mainly to quantity measures of integration. By comparing evidence for the eastern European countries to that from southern Europe, the degree of integration is furthermore measured in relative rather than in absolute terms.

In their seminal paper, Feldstein and Horioka (1980) have suggested to measure the degree of international capital mobility by looking at the correlation between domestic saving and investment:

$$(1) \quad \left(\frac{I}{Y}\right)_i = a + b\left(\frac{S}{Y}\right)_i + e_i$$

where  $I$  = domestic investment,  $S$  = domestic saving, and  $Y$  = gross domestic product. Feldstein and Horioka (1980: 318) have argued that *with perfect capital mobility, an increase in the saving rate in country  $i$  would cause an increase in investment in all countries [...]* while *estimates of  $b$  close to one would indicate that most of the incremental saving in each country has remained there*. This measure of capital mobility can be linked to interest parity conditions by noting that it implies a zero covariance between saving and investment (Lemmen 1998: 69):

$$(2) \quad \text{COV}\left(\frac{I_{i,t+k}}{Y_{i,t+k}}, \frac{S_{i,t+k}}{Y_{i,t+k}}\right) = 0$$

At the same time, investment depends negatively on the expected domestic real interest rate  $r$  and on an error term,  $\eta$  which captures all other factors which influence  $I$ :

$$(3) \quad I_{i,t+k} = -f E_t(r_{i,t+k}) + \eta_t$$

If (2) holds, the influences of the error term  $\eta$  and of the interest rate  $r$  on domestic savings must cancel out. This can be shown by decomposing the covariance between saving and investment into:

$$(2') \quad \begin{aligned} \text{COV}\left(\frac{I_{i,t+k}}{Y_{i,t+k}}, \frac{S_{i,t+k}}{Y_{i,t+k}}\right) &= \text{COV}\left(\eta_t, \frac{S_{i,t+k}}{Y_{i,t+k}}\right) - F \text{COV}\left(E_t(r_{i,t-k}^*), \frac{S_{i,t+k}}{Y_{i,t+k}}\right) - \\ &F \text{COV}\left(E_t(r_{i,t-k} - r_{i,t-k}^*), \frac{S_{i,t+k}}{Y_{i,t+k}}\right) = 0 \end{aligned}$$

where  $r^*$  = foreign interest rate. The second term on the LHS in (2') denotes the covariance between savings and the expected foreign interest rate, the third term gives the covariance between savings and the expected real interest rate differential. Hence, real interest parity, i.e.,  $E_t(r_{i,t-k} - r_{i,t-k}^*) = 0$ , may but must not hold necessarily in order for the Feldstein-Horioka criterion of perfect capital mobility to be met.

As regards the empirical measurement of  $b$  in equation (1), Feldstein and Horioka found a value of around 0.9. These results, which can be interpreted as evidence for an incomplete mobility of capital, have been confirmed by a host of subsequent studies.<sup>3</sup> Although there is evidence for an increase in capital mobility during the past two decades, international capital mobility has thus remained imperfect. Taking a longer-term perspective, Taylor (1996) finds that the level of capital mobility that was approached in the early 1990s with a  $b$  of 0.5 to 0.6 can be seen as a return to the levels observed already during the time of the Gold Standard. Moreover, studies of capital mobility on a national level tend to find lower correlations between regional saving and investment than on an international level,<sup>4</sup> one possible explanation being the redistribution of savings through public transfers. Bayoumi (1998) reports  $b$ -values of 0.61 to 0.86 for a cross-section of OECD countries for the years 1960-1993 which are substantially above the values for a cross-section of Canadian provinces for the years 1962 through 1993 (–0.07 including and 0.25 excluding federal saving). Recent results for Germany likewise suggest that the correlation between domestic saving and investment is lower on a regional than on a national level (Kellermann and Schlag 1998).

In addition to a redistribution by the government, asymmetries in information on financial markets might help to rationalize why intraregional exceeds international capital mobility. Gordon and Bovenberg (1997) have suggested that foreign investors are less well-informed about the domestic economy than domestic investors.<sup>5</sup> This informational constraint puts them at a disadvantage compared to domestic investors when bidding for an investment project, they thus run the risk of paying too much for domestic firms, and, hence, capital flows are lower than they would be under perfect information. While Gordon and Bovenberg model

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<sup>3</sup> See Bayoumi (1990, 1998), Coakley et al. (1995), Lapp (1996), Montiel (1994), or Taylor (1996) for comprehensive surveys of the empirical and theoretical literature on the issue.

<sup>4</sup> See, for example, the results of Bayoumi and Rose (1993) for the United Kingdom.

<sup>5</sup> A similar argument has been made by Gehrig (1993).



foreign direct investment decisions, their results are also applicable to other forms of capital inflows such as portfolio investments and foreign bank loans.

Many authors have challenged subsequently the interpretation of high  $b$ s as indicators of low capital mobility. Obstfeld (1995), for example, argues that other, omitted factors such as common shocks may be driving both domestic saving and investment. Saving and investment would thus be correlated even under full capital mobility. Bayoumi (1990) argues that government policy has been an important factor behind close post-war correlations of saving and investment, exerting its influence both directly through the imposition of capital controls and more indirectly through policies that targeted the current account.

Various econometric issues surrounding the validation of the Feldstein-Horioka results have furthermore been discussed in the literature. While Feldstein and Horioka used cross-section estimates, Gundlach and Sinn (1992) propose to work with time series data because the theoretical argument was about time patterns of saving and investment and because cross-section studies cloud different institutional structures between countries. They suggest to exploit the fact that the difference between saving and investment is the mirror-image of the current account balance, i.e., the difference between exports and imports of goods and services ( $CA_t = X_t - M_t$ ), and thus propose to test for the stationarity of the latter:

$$(4) \quad \left(\frac{I}{Y}\right)_t = a + b\left(\frac{S}{Y}\right)_t + e_t \Leftrightarrow \left(\frac{CA}{Y}\right)_t = -a + (1-b)\left(\frac{S}{Y}\right)_t - e_t$$

Under the assumption that the error term  $e_t$  is stationary (I(0)), it follows that if the current account is integrated of degree one, then  $b$  is not equal to one, and saving and investment move like independent random walks. Following the original interpretation of Feldstein and Horioka, this could be taken as evidence for capital mobility. Conversely, if the current account is stationary,  $b$  equals one, and capital is immobile. Gundlach and Sinn find that Germany, Japan, and the United States are integrated into the international capital market and find evidence for an increased degree of capital mobility in the post-Bretton Woods era.

One problem with this approach is that the error term may not be I(0) if, for example, a country receives foreign aid. In this case, the current account may not be stationary even though private capital flows are low or even nil. Bagnai and Manzocchi (1996) argue that this problem can be solved by testing for stationarity of the current account *minus* the amount of aid that a country has received. Using the modified current account for 37 developing countries for the years 1961 through 1988, Bagnai and Manzocchi cannot reject the hypothesis of capital

mobility but, at the same time, show that the countries are not fully integrated into the international capital market.

An additional strand of the literature questions the concept of measuring capital mobility by means of saving-investment correlations. Coakley and Kulasi (1997) confirm empirically the finding that saving and investment tend to be cointegrated but interpret these co-movements as evidence for current account solvency or an intertemporal budget constraint of an economy rather than imperfect capital mobility. The upshot is that a high (low) correlation of saving and investment in time series studies cannot *a priori* be taken as evidence of low (high) capital mobility. Hence, long-run correlations would indeed be expected to be close to one due to an intertemporal budget constraint while low short-run correlations can be interpreted as indicators of capital mobility (Lemmen 1998).

### **3 Degree of Integration**

Economic theory predicts that the abolition of capital controls has positive welfare effects because liberalizing capital flows allows a country to draw on foreign savings to finance domestic investment. Neoclassical growth accounting would predict that mobile capital flows primarily out of capital-abundant developed economies and into capital-strapped developing and transition economies. This is because, by the law of diminishing returns, marginal returns to capital in the latter should exceed marginal returns in the former.

Both the transition economies and the southern members of the EU have in fact undertaken quite significant efforts during the past two decades to liberalize capital flows. In the transition economies, most restrictions on the free flow of capital have been abolished gradually during the reform process. In southern Europe, the process of capital market integration has been speeded up by EU-membership. This section briefly reviews these liberalization episodes before turning to empirical evidence on the degree of openness for foreign capital for the two groups of countries.

### 3.1 Liberalization of Capital Flows

To date, the transition economies under review have reached a degree of openness for foreign capital at least comparable to a number of other emerging markets. All have established full current account convertibility, have abolished restrictions on flows of foreign direct investment and longer-term capital, and are also fairly open towards short-term and portfolio capital (Backé 1996; Buch, Heinrich, and Pierdzioch 1998).<sup>6</sup> The reform states have tended to choose a gradual reform sequence: current account convertibility was established relatively soon but capital flows have remained more tightly regulated. The move towards greater capital account convertibility has been stimulated by increased capital inflows and thus by market forces, on the one hand, and by the intention to join the OECD and to accept the convertibility requirements of the IMF, on the other hand.

Yet, differences between the accession countries prevail as well. At one end of the spectrum is Estonia which has fully liberalized all capital account transactions as early as in 1994. Slovenia, in contrast, has taken the most restrictive approach to external financial liberalization. Whereas current account convertibility was de facto introduced in early 1992, capital outflows are generally subject to an official authorization, and inflows of financial credits have been subject to a reserve requirement since early 1995.<sup>7</sup>

The Czech Republic, Hungary, and Poland fall in between these two extremes. Common features of their foreign exchange laws are a more liberal regime on foreign direct investment than on other capital account transactions as well as less restrictions on capital inflows than on capital outflows. With regard to capital inflows, foreign direct investments have generally been liberalized. Inward portfolio investment is generally permitted but the placement of domestic securities abroad requires usually a permission. Mid- and long-term financial credits have been liberalized throughout the region; Czech legislation is the most liberal with regard to inflows of short-term capital. Concerning capital outflows, the major restrictions

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<sup>6</sup> Even under socialism, the countries were not isolated fully from international flows and have, in particular during the 1970s, borrowed quite substantially internationally. However, the bulk of these capital inflows were official loans. Private capital played a less important role, and access to foreign direct investment and portfolio capital was practically non-existent.

<sup>7</sup> Since then, 40 percent of financial credits with a maturity of less than 5 years raised from abroad by residents needs to be deposited in a non-interest bearing tolar deposit with the Bank of Slovenia. In 1996, the maturity was prolonged to 7 years, and a 10 percent deposit requirement was introduced for certain longer-term financial credits. See the homepage of the Bank of Slovenia (<http://www.bsi.si>) for details.

that are still in place apply to the opening of accounts with foreign banks abroad, outward financial credits or guarantees, and the sale and purchase of domestic currency abroad. In all three countries, the authorities have retained the right to restrict certain capital account transactions during periods of severe balance of payments problems or at least to raise substantially the costs of these transactions.

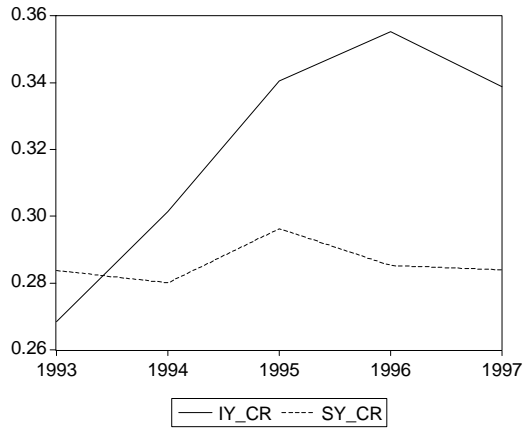
Arguably, the advanced transition economies have already reached a greater degree of openness for foreign capital than the southern members of the EU *prior* to their accession to the EU. According to the annual report on exchange rate restrictions published by the IMF, the transition economies under review had imposed less controls on capital account items in 1995 than the southern Europeans in the early 1990s (IMF 1996). Although a simple comparison of these indicators has several flaws, primarily because of the lack of qualitative information on the importance of these restrictions, the pattern would be unlikely to reverse if additional information was taken into account. If anything, this suggests that the effects of accession on capital flows will be less pronounced than for the southern members. In any case, for none of the southern members has entry into the EU been paralleled by a full abolition of capital controls. After becoming members of the EU in 1981 (Greece) and 1986 (Portugal and Spain), the countries retained controls on capital flows up to 1992 (Spain and Portugal) and 1994 (Greece), respectively. Controls on capital flows outside Europe were even maintained until 1993 in Spain and 1995 in Greece.

### 3.2 Stylized Facts

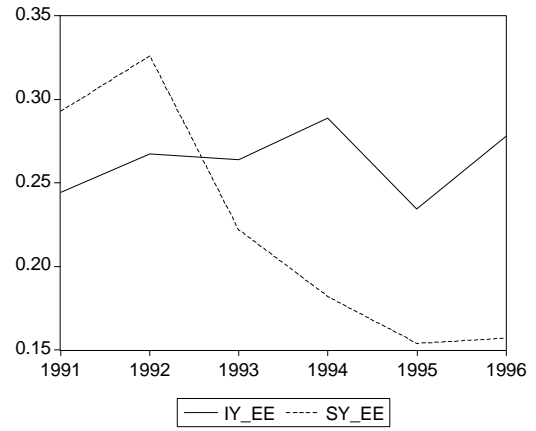
Capital account liberalization and the reform process as such have, at least in the past couple of years, enabled the transition economies to import quite substantial amounts of foreign capital. In the Czech Republic, Estonia, and Hungary, capital inflows were in a range comparable to that of Chile, Mexico, or Thailand during their inflow episodes (Buch et al. 1998). In all countries, net capital inflows exceeded 5 percent of GDP by a significant margin for an extended period. In Poland, mainly because of unresolved foreign debt issues, inflows were somewhat more moderate but have picked up lately as well. Slovenia, in contrast, has hardly drawn on foreign savings thus far.

Graph 1 — Saving and Investment in Relation to GDP 1970–1997

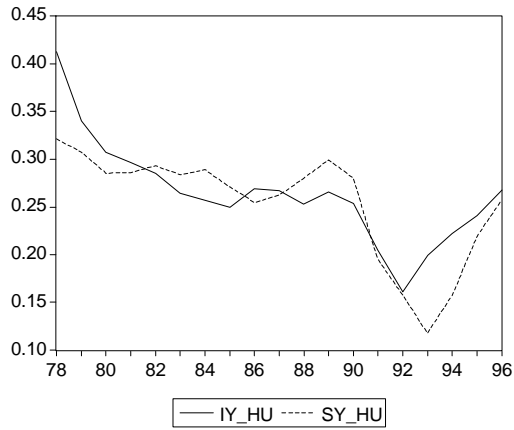
### Czech Republic



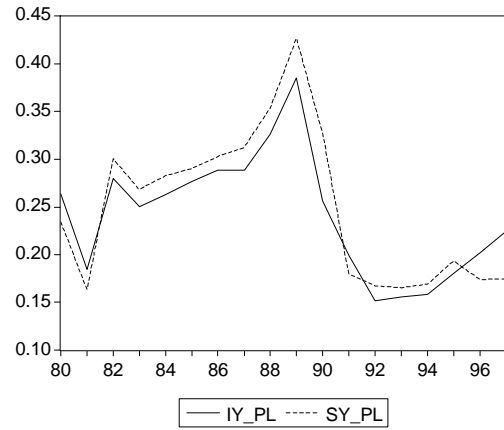
### Estonia



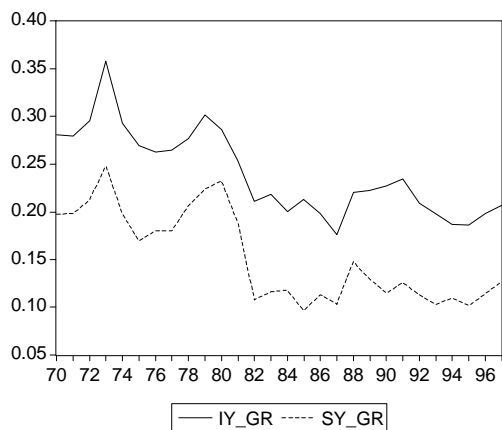
### Hungary



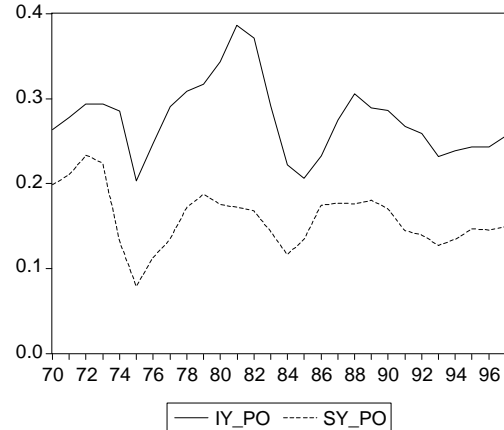
### Poland



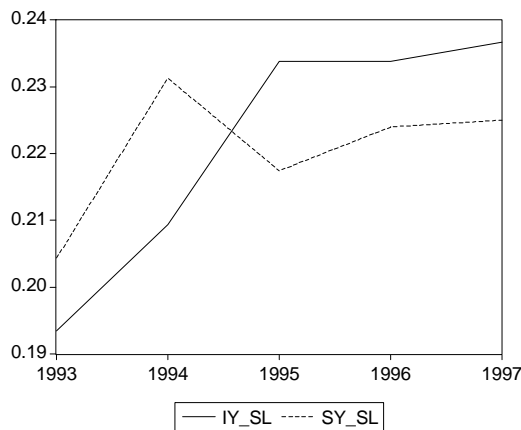
### Greece



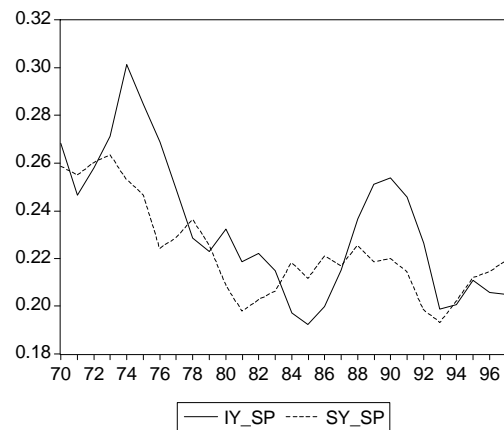
### Portugal



### Slovenia



### Spain



Note: Domestic investment (IY) = gross investment + changes in inventories, Domestic saving (SY) = domestic investment + exports – imports; all data are in current prices.

Sources: IMF (1998), own calculations.

While the share of investment in GDP fell quite dramatically in Hungary and Poland at the beginning of reforms (Graph 1),<sup>8</sup> the available time series are too short to trace fully developments in the other three transition economies. Earlier data for former Czechoslovakia, however, suggest that the incipient decline in investment could be avoided. Investment tended to increase in 1992/1993, hence contributing to the rebuilding of the capital stock which the transformation process and the accompanying shift in relative prices had rendered obsolete.

Increases in domestic saving could be observed only in Hungary and in Slovenia since 1993. After an initial decline in the share of savings in GDP, aggregate savings rates have remained flat in Poland and the Czech Republic. Except for a temporary increase in 1992, savings in Estonia tended to decline. A combination of shorter time horizons (an increase in the discount rate), negative real interest rates during the initial reform period, and lower incomes can explain this downward shift in savings (Brücker and Schrettl 1996).<sup>9</sup>

Foreign capital has filled the gap resulting from increased investment and lower savings. Current account deficits reached almost 10 percent of GDP in Hungary

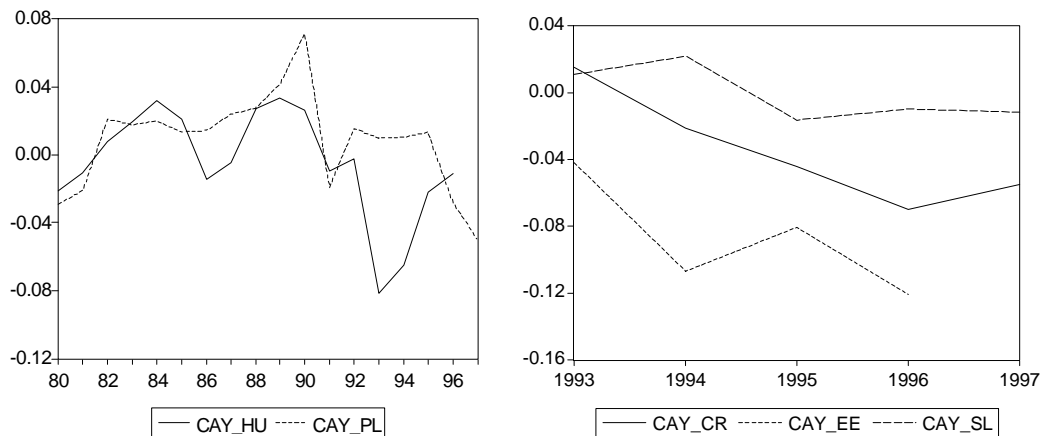
<sup>8</sup> The exceptionally high share of domestic investment in Poland in 1989 is due to a large increase in inventories.

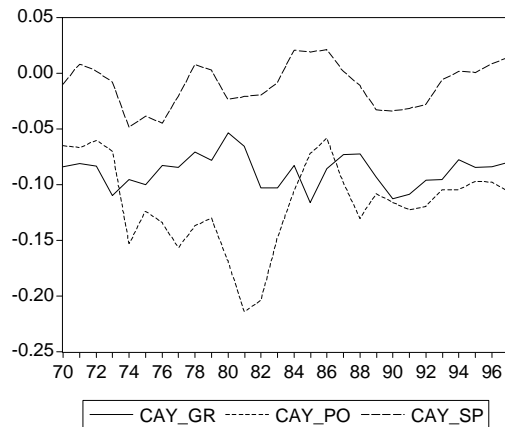
<sup>9</sup> Another conceivable explanation is a high rate of time preference of households (Piazolo 1997). If households are reluctant to accept deviations from a uniform pattern of consumption, they would try to smoothen consumption over time. If the economic setting improves as a result of reforms or of expected EU membership, production and expected future consumption increase. Households might thus shift consumption from the future to the present, and savings rates might fall (or fail to increase).

prior to 1995 (Graph 2). Eventually, these large capital inflows became unsustainable and forced the country into an austerity program. Subsequently, capital inflows were reduced substantially. Current account imbalances in Estonia and Poland have in contrast been widening in the past couple of years. In the Czech Republic, a trend towards growing current account deficits has been reversed after the currency crisis of May 1997. At first sight, these observations suggest that the transition economies are integrated increasingly into the international capital market and that they can finance domestic investment through foreign savings.

As regards current account balances, the three southern European countries have displayed quite different patterns (Graph 2). While Greece has imported foreign capital by the amount of 5 to 10 percent of its GDP since the early 1970s, capital imports of Spain have been much lower throughout (0 to 5 percent of GDP), and the country has at times even been a net exporter of capital. Portugal, in contrast, looked similar to Greece prior to 1974 and since the mid-1980s, but has imported even greater amounts of foreign capital during an interim period. Eyeballing Graph 2 does not suggest that EU-membership has had a significant impact on the countries' ability to draw on foreign savings. Likewise, it is difficult to detect a sustained impact of membership on the level of saving and investment (Buch, Heinrich, and Piazzolo 1998).

*Graph 2 — Current Account Balances in Relation to GDP 1970–1997*





CAY = current account/GDP

Source: IMF (1998), own calculations.

While econometric analyses of the impact of EU membership on capital mobility are hardly available, a considerable amount of evidence is available concerning capital mobility in general. For Europe, as for other OECD economies, time series data tend to show an increasing degree of international capital mobility. For the time between 1960 and 1988, Argimón and Roldán (1994) find that domestic saving and investment were cointegrated in Spain, France, Italy, Denmark, Belgium, and Ireland. Lemmen (1998) argues that it is more appropriate to assess the degree of capital mobility on the basis of short-run correlations between saving and investment because, from a theoretical point of view, long-run correlations should be close to one anyway. He does in fact find support for the hypothesis of long-run coefficients close to one while short-run correlations have been much smaller and have tended to decline over time. In the southern European economies, short-run capital mobility was below the OECD-benchmark of 0.6, albeit not necessarily to a significant degree.

The similarity of results for EU and OECD countries makes it difficult to isolate the impact of deregulation at the European level on capital mobility from global trends. Moreover, evidence on the degree of *intra*-European capital mobility is lacking. Although Armstrong et al. (1996) find extremely low correlations between saving and investment for a cross-section of EU countries and interpret this as evidence that the degree of capital mobility within Europe is similar to the degree of capital mobility within countries, this interpretation seems premature for two reasons. First, their empirical results seem not to be consistent with other cross section estimates eluded to above. Second, the correlation between total national saving and investment does not allow a distinction between capital flows



within and outside Europe and does thus not provide evidence on intra-EU capital flows.

### 3.3 Saving Investment Correlations

#### 3.3.1 Panel Data

In order to test for the correlation between saving and investment in transition economies, a panel of annual observations of domestic saving and investment rates for the five accession states (Czech Republic, Estonia, Hungary, Poland, Slovenia) has been constructed. As a benchmark, a panel for three southern European members of the EU has been used. All data have been drawn from the International Financial Statistics of the IMF. For both samples, regressions of equation (1) have been run. Because it cannot be assumed *a priori* that the constant terms are identical for each country, different intercepts have been allowed for. In fact, these fixed effects were significant in particular for the equations estimated in levels. Correction for autocorrelation by including autoregressive terms of first and second order has furthermore been necessary. This has, however, not in all cases been sufficient to eliminate fully evidence of autocorrelation in the residuals.

Equation (1) has been estimated for the reform period (after 1989) and for the entire period (1980 through 1997), hence implicitly looking at time series *and* cross sectional properties of the underlying series. Following Obstfeld (1995), time series properties could be interpreted as capturing the short-run dynamics of saving and investment while cross-sectional estimates would reflect long-run relationships. Yet, as has been argued above, the small sample period does not really allow us to draw conclusions regarding the long-run.

The first striking observation is that in the eastern and southern European countries correlations between domestic saving and investment are surprisingly similar (b-values of 0.5 to 0.6) (Table 1). In fact, Wald tests performed for each panel separately did not allow to reject the hypothesis that the coefficients in the two panels are identical. Estimates of pooled samples including southern and eastern European countries likewise showed an insignificant coefficient on a dummy variable for eastern Europe.<sup>10</sup>

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<sup>10</sup> To save space, we do not report these results. Yet, they are available from the author upon request.

Table 1 — Correlation Between Saving and Investment (Pooled Data)  
1980–1997

	Eastern Europe		Southern Europe	
	1980–97	1989–97	1980–97	1989–97
	<i>Dependent variable: <math>(I/Y)_t</math></i>			
<i>Explanatory variable</i>				
$\left(\frac{S}{Y}\right)_t$	0.60*** (6.20)	0.52*** (3.18)	0.49*** (3.63)	0.49** (2.48)
AR(1)	0.47*** (3.03)	0.46** (2.18)	1.18*** (8.66)	0.95*** (5.49)
AR(2)			–0.58*** (–5.42)	–0.30 (–1.60)
<i>Fixed effects</i>			<i>Fixed effects</i>	
Czech Republic	0.18***	0.19***	Greece	0.15***
Estonia	0.16***	0.17***	Portugal	0.20***
Hungary	0.10***	0.12***	Spain	0.11***
Poland	0.09***	0.10***		0.11**
Slovenia	0.10***	0.12***		
$\bar{R}^2$	0.83	0.81	0.87	0.88
Durbin Watson	2.32	2.52	1.91	2.05
Observations	47	30	54	27
Wald tests (prob.)				
b = 1	0.00***	0.00***	0.00***	0.02**
$b_E = b_S^a$	0.25	0.83	0.43	0.89
	<i>Dependent variable: <math>D(I/Y)_t</math></i>			
<i>Explanatory variable</i>				
$\Delta\left(\frac{S}{Y}\right)_t$	0.61*** (5.78)	0.51*** (3.41)	0.58*** (4.53)	0.66*** (3.62)
AR(1)			0.36*** (2.38)	
<i>Fixed effects</i>				
Estonia	0.02**			
$\bar{R}^2$	0.55	0.41	0.36	0.25
Durbin Watson	2.49	2.46	1.67	1.35
Observations	47	30	54	27
Wald tests (prob.)				
$\beta = 1$	0.00***	0.00***	0.00***	0.07**
$b_E = b_S^a$	0.77	0.31	0.83	0.42

White heteroscedasticity consistent t-values in brackets. \*\*\* (\*\*, \*) = significant at 1 (5, 10) percent level. — a) Test of identical coefficients in the two panels E = East, S = South.

Source: own calculations.

Wald tests furthermore revealed that the coefficient on the savings rate was significantly different from one. Hence, while saving and investment have been correlated, correlation has been less than perfect, indicating that foreign capital has been used to finance domestic investment (and *vice versa*). While the correlation between saving and investment in eastern Europe was somewhat less tight in the years after 1989 than in the full sample period, this decline has not been statistically significant.

Time-series estimates on the basis of the levels of saving and investment rates would be biased if the two variables are non-stationary. Because of the small sample period, tests on the stationarity of the time series could not be performed. Earlier results do suggest, however, that the assumption of non-stationarity of savings and investment rates cannot be dismissed *a priori* (Coakley et al. 1996; Sarno and Taylor 1998; Kellermann and Schlag 1998).<sup>11</sup> We have thus also estimated equation (1) in first differences. The results are similar. The explanatory power of the equations for eastern Europe was reduced but remained around an  $\bar{R}^2$  of 0.4 to 0.5. For southern Europe, in contrast, it worsened considerably while autocorrelation posed less of a problem. For both regions, the hypothesis that saving and investment are perfectly correlated could be rejected, and there was no significant difference in the coefficients on savings in the two samples.

In an additional step, the sample of transition economies has been expanded by a group of economies which have not been included in the first round of EU candidates. Data availability limited the sample to Armenia, Belarus, Bulgaria, the Kyrgyz Republic, Romania, Russia, the Slovak Republic, and the Ukraine. Both in terms of depth and breadth of reforms, these countries lag behind the EU candidates (EBRD 1998). This suggests that the expanded group should be less open for foreign capital than the countries considered so far. In fact, the link between domestic saving and investment is decidedly higher with a  $\beta$  close to one for this group of countries (irrespective of using levels or first differences). When data for the advanced and less-advanced countries are pooled together, there is weak evidence (at a 12 percent level of significance) that „institutional proximity“ to the EU weakened the link between domestic saving and investment.<sup>12</sup>

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<sup>11</sup> See also Table 2.

<sup>12</sup> More specifically, proximity to the EU has been captured through a dummy variable which takes the value of 2 for the five countries under review, 1 for the second-round candidates (Bulgaria, Romania, Slovak Republic), and 0 otherwise. Results are available from the author upon request.

### 3.3.2 Time Series Data

With the exception of the Czech Republic, Estonia, and Slovenia, time series data have allowed us to estimate equation (1) also on a country-by-country basis for the time since the 1970s. Moreover, the time series could be used to test explicitly for the stationarity of the data. This was done by running a regression for the level of saving and investment rates on their lagged levels and first differences:

$$(5) \quad \Delta\left(\frac{X}{Y}\right)_t = \mu + (\alpha_0 - 1)\left(\frac{X}{Y}\right)_{t-1} - \sum_{j=1}^{n-1} \alpha_j \Delta\left(\frac{X}{Y}\right)_{t-j} + \gamma \cdot t + \varepsilon_t$$

where  $X = S, I$ . The hypothesis  $H_0: \alpha_0 - 1 = 0$  that the variable is non-stationary and behaves like a random walk (i.e., that it contains a unit root) is tested against the hypothesis  $H_1: \alpha_0 - 1 < 0$ , i.e., the variable is stationary. Similarly, running the ADF-test for the differenced variables implies a test of  $H_0: X$  is I(2).

Table 2 summarizes the results of the ADF tests. With the exception of the Portuguese saving and investment rates as well as the Hungarian and the Polish saving rate, all variables are I(1). Hence, while estimating equation (1) in levels is the appropriate method for Portugal, the non-stationarity in the data needs to be taken into account for the other countries. This is done by estimating (1) in an error-correction form which allows us to identify both short-run and long-run effects of changes in domestic saving on domestic investment:

$$(1') \quad \Delta\left(\frac{I}{Y}\right)_t = (\alpha_0 - 1)\left[\left(\frac{I}{Y}\right)_{t-1} - \beta\left(\frac{S}{Y}\right)_{t-1}\right] - \sum_{i=0}^{n-1} \alpha_i \Delta\left(\frac{I}{Y}\right)_{t-i} - \sum_{i=0}^{m-1} \gamma_i \Delta\left(\frac{S}{Y}\right)_{t-i} + \varepsilon_t$$

The error-correction-model in (1') can be derived from a general rational lag distribution and does therefore not restrict the dynamic structure of the model. Changes in investment thus depend (i) on deviations from long-run-equilibrium, i.e., on the error-correction term in brackets, (ii) on short-run effects of changes in the exogenous and in the lagged endogenous variables, and (iii) on an error term  $\varepsilon$ . If the coefficient  $(\alpha_0 - 1)$  is significantly less than zero, investment declines (increases) if it has been above (below) its equilibrium level in the previous period. There would thus be a stationary long-run relationship between saving and investment, i.e., the two would be cointegrated.

In addition, it has been checked whether EU membership and the start of the transformation process has had a significant impact on the magnitude of  $\beta$  in southern and eastern Europe, respectively. This has been done by including dummy variables which were set to zero prior to accession to the EU, i.e., prior to 1981 for Greece and to 1986 for Portugal and Spain, and prior to the start of

the transformation process for Hungary in 1987 and for Poland in 1989. A linear time trend has furthermore been included in each equation to allow for a possible shift in the saving-investment correlation over time. Except for the case of Spain, where a negative time trend was found, this variable was insignificant.

Table 2 — *ADF-Tests on Unit Root in Saving and Investment Rate*

	Levels		First Differences		Degree of Integration
	Specification <sup>a</sup>	t-value	Specification <sup>a</sup>	t-value	
Dependent variable: I/Y					
Greece	TC1	-2.52	001	-5.17***	I(1)
Hungary	TC1	-2.52	001	-4.84***	I(1)
Poland	0C0	-1.72	000	-4.63***	I(1)
Portugal	0C1	-3.52**	000	-3.50***	I(0)
Spain	TC1	-2.96	001	-3.11***	I(1)
Dependent variable: S/Y					
Greece	TC1	-2.85	000	-4.66***	I(1)
Hungary	TC1	-3.56*	000	-3.73***	I(0)
Poland	0C0	-1.52	001	-3.13***	I(0)
Portugal	0C1	-4.65***	001	-4.84***	I(0)
Spain	0C1	-1.97	001	-3.19***	I(1)

a) Trend, intercept, lag length. — Sample period: 1970-1997 for Greece, Portugal, and Spain. 1978-1996 for Hungary. 1980-1997 for Poland.

Source: own calculations.

In terms of the overall performance of the time series estimates, no satisfactory results were obtained for the eastern European countries. A possible explanation is the substantial structural break due to the transformation process which is likely to affect the quality of the underlying data. For Poland, there was no stable cointegration relationship between saving and investment. For Hungary, the coefficient on the savings variable was insignificant. We thus refrain from interpreting these results in the following.

Table 3 — Correlation Between Saving and Investment (Time Series Data) 1971–1997

	Greece $D\left(\frac{I}{Y}\right)_t$	Spain <sup>a</sup> $D\left(\frac{I}{Y}\right)_t$		Portugal $\left(\frac{I}{Y}\right)_t$
Const.	0.06 (2.86)	0.02 (0.47)	Const.	0.07 (1.53)
$\left(\frac{I}{Y}\right)_{t-1}$	-0.64* (-3.32)	-0.47*** (-4.89)	$\left(\frac{S}{Y}\right)_{t-1}$	0.41** (2.29)
$\left(\frac{S}{Y}\right)_{t-1}$	0.58 (3.22)	0.44 (2.46)	$\left(\frac{I}{Y}\right)_{t-1}$	0.91*** (5.01)
$D\left(\frac{I}{Y}\right)_{t-1}$		0.35 (3.33)	$\left(\frac{I}{Y}\right)_{t-2}$	-0.38** (-2.21)
$D\left(\frac{S}{Y}\right)_t$	0.78 (7.29)			
Trend		-0.001 (-2.14)		
Dummy		0.02 (2.45)		
JB	0.26	0.46		0.13
LM1	0.97	0.23		0.42
LM2	0.96	0.25		0.63
White	0.73	0.17		0.21
$\bar{R}^2$	0.71	0.56		0.69
Observations	27	26		26
Period	1971-1997	1972-1997		1972-1997

\*(\*\*, \*\*\*) = significant at the 10(5,1)-percent level. For Greece and Spain, significance levels are reported only for the lagged endogenous variable. — a) Estimated with the method suggested by Newey and West (1987) to correct for autocorrelation and heteroscedasticity. — JB = Jarque Bera test on normal distribution of the residuals (probability of not rejecting the hypothesis that the residuals follow a normal distribution) — LM1 and LM2 = Lagrange Multiplier Tests on 1st and 2nd order autocorrelation (probability) — White = White test on heteroscedasticity (probability).

Source: own calculations.

Results for the southern EU-members, in contrast, are quite encouraging (Table 3). The explanatory power of the equations is relatively high ( $\bar{R}^2$  exceeding 0.55), there are significant cointegration relationships between domestic saving and investment for Greece and Spain, and a significant coefficient on the savings variable in the case of Portugal. The long-run b-coefficients can be calculated by setting all lagged variables equal to the contemporaneous variables. The resulting coefficients look surprisingly similar for the three countries and take values of around 0.9. A possible explanation for the higher coefficients in the time series estimates as compared to the pooled regressions reported in Table 1 is that a longer time span is considered in which the intertemporal budget constraint was

binding. Tests on parameter stability (cusum, cusum-of-squares, n-step forecast tests) did generally not provide evidence against the hypothesis of parameter stability. Only in the case of Portugal, the cusum-of-squares tests indicated parameter instability between 1981 and 1988.

With the exception of Spain where the EU-dummy entered with a positive sign, the dummy has been insignificant and has thus been dropped. In order to take account of the differences in timing of EU-accession and full capital account liberalization, an additional dummy variable was set at 0 prior to accession to the EU, 0.5 between accession and the full abolition of capital controls, and 1 thereafter. Yet, no statistically significant effect of this variable was found.

The observation that EU membership seems not to have had a statistically significant effect on the degree of openness towards foreign capital warrants an explanation. Probably the most important factor behind this result is the gradual nature of the process of integration. As capital controls were abolished sequentially, EU-membership was not accompanied by full liberalization. Moreover, announcement effects have been at work, triggering substantial inflows of foreign capital even prior to the actual event. Finally, it is important to note that the countries under review were able to substantially draw on foreign finance already before accession.

### 3.4 Alternative Measures

In order to test the robustness of our results, we have also experimented with the alternative approaches to measuring the degree of capital mobility that have been discussed above. Because the approach suggested by Gundlach and Sinn (1992) is based on time series estimates, it could be used only for two of the eastern European countries. Hence, equation (5) has been estimated for both the level and the first difference of the current accounts of Hungary and Poland as well as for the southern European economies. Recalling that stationarity of the current account is equivalent to domestic saving and investment being correlated, Table 4 confirms the results of the time series estimates above for Spain. For Greece and Portugal, in contrast, the current account is  $I(1)$  which could be interpreted as evidence for capital mobility. For Hungary, there is evidence for a stationary current account while for Poland there is evidence that the current account is  $I(1)$ . Hence, these tests do not allow us to clearly distinguish the southern from the eastern European countries.

Table 4 — *ADF-Tests on Unit Root in the Current Account*

	Levels		First Differences		Degree of Integration
	Specification <sup>a</sup>	t-value	Specification <sup>a</sup>	t-value	
Dependent variable: Current account					
Greece	TC0	-0.85	TC0	-4.78***	I(1)
Hungary	001	-1.85*	000	-3.89***	I(0)
Poland	001	-1.37	000	-1.90*	I(1)
Portugal	TC1	-1.51	000	-2.53**	I(1)
Spain	002	-2.71***	000	-3.09***	I(0)

Sample period: 1970-1997 for Greece, Portugal, and Spain. 1978-1996 for Hungary. 1980-1997 for Poland. — a) Trend, intercept, lag length.

Source: own calculations.

In addition, the approach suggested by Shibata and Shintani (1998) was employed to estimate the correlation between domestic consumption and net output. The results for the transition economies indicated a relatively strong and statistically significant link (about 0.8). Yet, no statistically reliable results were obtained for the southern members of the EU and it has thus not been possible to obtain a relative measure of integration. Overall, however, these alternative measures of integration put the above results of the Feldstein-Horioka regressions somewhat into perspective as they provide partly different results.

## 4 Impact of EU Membership

Quantitative measures of capital market integration make it difficult to argue that the advanced transition economies have been less integrated into the international capital market than the southern members of the EU in the past decade. In addition, we have failed to find a significant impact of EU membership on the degree of openness towards foreign capital. Hence, it appears unlikely that membership in the EU would further promote integration in quantitative terms. Yet, this argument neglects that the structure of capital flows still differs between the two groups of countries and that further adjustments in the qualitative structure of capital flows can be expected.

Assessing the likely impact of EU membership on the structure of capital flows for the transition economies is, of course, highly speculative. The approach taken in this section is to show whether capital flows to the southern EU members



looked different after membership as compared to the time before. Although the impact of EU membership would have to be determined by using data from similar countries which have not become members of the EU as a control group, this comparison still carries some information. Subsequently, the structure of capital flows to southern Europe is compared to evidence from eastern Europe.

Table 5 gives the composition of capital inflows for Greece, Portugal, and Spain both for the time before and after the countries' accession to the EU. The data reveal, first of all, a quite significant change in average annual inflows of foreign capital in gross as well as in net terms after membership. In the case of Spain, gross annual capital inflows (measured in current US-Dollars) increased almost tenfold after accession to the EU whereas the increase was somewhat more moderate in the case of Portugal. For Greece, annual capital inflows only less than doubled. Both Portugal and Spain have also increased their exports of capital, hence the increase in net flows was less pronounced than for gross flows.

Measured in relation to GDP, gross inflows almost tripled and doubled in the case of Spain and Portugal, respectively, while they declined in Greece. In net terms, however, an increase relative to GDP has occurred only in Spain.

Generally, it would be misleading to attribute the increase in capital inflows to EU membership alone and thus to expect a similar effect of the new accession round. This is because the increase in capital flows reflects to some extent an increase in global capital flows. Moreover, the transition economies have already experienced a quite significant „liberalization“ effect such that the accession effect is likely to be less visible.

Table 5 — Capital Inflows Pre- and Post-Accession to the EU 1975–1997

	1975-1986	1987-1997	1975-1997
	<i>Greece<sup>b</sup></i>		
	Gross inflows (%)		
Foreign direct investment	29.2	25.4	26.0
Other investment	70.8	74.6	74.0
Total (billion US-Dollar) <sup>a</sup>	1.6	3.0	2.7
Total (in % of GDP)	5.1	4.3	4.4
	<i>Portugal</i>		
	Gross inflows (%)		
Foreign direct investment	14.5	19.6	19.0
Portfolio investment	8.1	31.1	28.2
Other investment	77.5	49.3	52.9
Total (billion US-Dollar) <sup>a</sup>	1.0	7.4	4.0
Total (in % of GDP)	4.7	9.3	8.3
	Net inflows (%)		
Foreign direct investment	17.8	52.5	42.0
Portfolio investment	10.7	19.5	16.9
Other investment	71.5	27.9	41.1
Total (billion US-Dollar) <sup>a</sup>	0.8	1.9	1.3
Total (in % of GDP)	3.6	2.4	2.7
	<i>Spain</i>		
	Gross inflows (%)		
Foreign direct investment	37.9	25.5	26.9
Portfolio investment	5.5	34.6	31.3
Other investment	56.5	40.0	41.8
Total (billion US-Dollar) <sup>a</sup>	3.9	34.1	18.4
Total (in % of GDP)	2.4	7.1	5.9
	Net inflows (%)		
Foreign direct investment	44.4	42.0	42.5
Portfolio investment	4.6	68.9	55.8
Other investment	51.0	-10.9	1.7
Total (billion US-Dollar) <sup>a</sup>	2.9	12.2	7.3
Total (in % of GDP)	1.7	2.6	2.3

a) Annual average. — b) For Greece, data start in 1976. Pre-accession period up to 1981. Data on portfolio inflows as well as on outflows of foreign direct investment have not been available.

Source: IMF (1998), own calculations.

As regards the structure of capital flows, EU membership may seem particularly important for foreign direct investment (FDI) which has high fixed costs. As membership tends to reduce uncertainty about future business conditions and thus reduces the value of postponing an investment project, it could be expected to raise the share of FDI in total capital flows. The increase in FDI following mem-

bership has indeed been relatively pronounced for Portuguese net capital flows whereas the impact on inflows of FDI into Spain has been relatively modest. At least for the case of Spain, however, there has been a quite significant announcement effect of EU membership, raising FDI inflows already prior to accession. For Greece, in contrast, the share of FDI in gross capital flows has declined after accession to the EU.<sup>13</sup> Both for Spain and Portugal, the share of portfolio investments has clearly increased after accession at the expense of other investment (bank loans, deposits etc.).

It would be of interest to compare the structure of capital flows of the potential new EU members and the southern members prior to their accession to the EU in order to show the likely impact of enlargement. Yet, such a comparison is flawed because of the securitization of financial assets that has taken place in the meantime. As Table 6 shows, portfolio investment has played a much more important role for the transition economies in the years 1993 through 1997 than for the southern EU members prior to their accession. Whereas in southern Europe the share of portfolio capital was between 5 and 10 percent of capital inflows, the respective shares were between 20 and 40 percent for eastern Europe.<sup>14</sup> Comparing more recent data for the two sets of countries reveals that portfolio investment has tended to be higher in southern than in eastern Europe. At the same time, other investments such as bank loans and deposits have been somewhat more important in eastern Europe.

Looking at the magnitude of both gross and net capital flows in relation to GDP reveals striking differences between the transition economies. In the Czech Republic and Estonia, capital inflows have been much larger in the 1993-97 period than both in the other three economies and in southern Europe. In particular for these countries, a sustained increase in capital inflows in response to EU membership seems unlikely.

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<sup>13</sup> Due to data limitations, an assessment of net flows and of the impact on portfolio investments is not possible.

<sup>14</sup> Because of the repayment of Hungarian foreign debt during the period under review, the share of portfolio investment and FDI is biased upward.

Table 6 — Capital Inflows in the Transition Economies 1993–1997

	Czech Republic	Estonia	Hungary	Poland	Slovenia
	<i>Gross inflows (% of total)</i>				
Foreign direct investment	18.4	31.8	81.5	...	27.0
Portfolio investment	17.2	20.6	48.4	...	26.0
Other investment	64.4	47.5	–29.9	...	47.0
Total (in % of GDP) <sup>a</sup>	15.9	18.8	6.6	...	4.1
	<i>Net inflows (% of total)</i>				
Foreign direct investment	26.1	19.2	49.5	57.3	40.0
Portfolio investment	30.7	41.7	81.9	25.0	37.5
Other investment	43.2	39.0	–31.3	17.7	22.5
Total (in % of GDP) <sup>a</sup>	9.1	11.7	7.0	2.5	2.7

a) For Hungary: 1993-1996.

Source: IMF (1998), own calculations.

## 5 Conclusions

The integration of the transition economies of central and eastern Europe into the international capital markets is one of the major challenges of the reform process. Attracting foreign savings to finance domestic investment can be of great value for the new market economies and can give them access to superior know how and technology. At the same time, the recent financial crises have shown that increased integration into international capital flows can also expose countries to adverse external shocks. The aim of this paper has been to assess the degree of integration that the transition economies have attained to date as well as to derive hypotheses about the impact of EU membership.

Tests based on the correlation between domestic saving and investment do not allow us to reject the hypothesis that southern Europe and the advanced transition economies had a similar degree of openness to foreign capital in the 1980s and 1990s. Saving and investment were correlated positively, which implies a less-than-perfect mobility of capital. Yet, the countries could draw on foreign savings to finance domestic investment. The coefficients on the saving variable, which we have found to be in the order of 0.5 to 0.6, are surprisingly similar to those that have been estimated for industrialized countries during the past one or two decades. At the same time, there is evidence that domestic saving and investment in

less advanced transition economies are more closely correlated than in the advanced countries.

Although future research using longer time series would have to further check these results, they yet suggest that the reform states are, at least in quantitative terms, integrated into the international capital markets to a degree similar to other OECD countries. Capital inflows in some countries had been particularly high prior to the outbreak of the Asian financial crisis, and the ability of the countries to deal with the spill-over effects will be an important litmus test for the sustainability of their policies. First evidence suggests that the recent crises have had no permanent impact on the access of the advanced reform states such as the Czech Republic, Hungary, or Poland to international capital markets.<sup>15</sup>

At the same time, there remain differences in the structure of capital flows between the two groups of countries. Portfolio capital flows are less important for the eastern European countries than for southern Europe today but have a higher share already than in the latter prior to their accession. Still, the share of portfolio investment in total capital flows is likely to increase. A sustained effect on FDI, however, depends largely on policies at the domestic level which enhance the confidence of investors. If anything, the accession effect for the new members is likely to be smaller than for the southern members because much of the stock adjustment has already taken place.<sup>16</sup>

As the paper has taken a relatively narrow focus on quantitative aspects of integration, it would be premature to draw far-reaching policy conclusions. Perhaps the most important finding is that membership in the EU is unlikely to boost capital market integration to a significant degree and to trigger huge capital inflows. Rather, changing patterns of capital flows may make the economies less dependent on specific types of capital inflows, and may thus enhance the sustainability of their balance of payments positions. This holds especially as membership in the EU will require that the new members abolish remaining entry barriers into their financial sectors and hereby import institutional stability. Seen from this angle, the benefits of further capital account liberalization may outweigh the risks of such a strategy.

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<sup>15</sup> See, for example, Deutsche Bank Research (1998).

<sup>16</sup> See also Brenton et al. (1998).

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