FAST SAILING TOWARD THE EURO: DANGERS OF THE LEE SHORE[1]

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Estimation and simulation of sustainable real exchange rates in four of the new EU member countries point to potential difficulties in sustaining the ERM2 regime if entered too soon and with weak policies. According to the estimates, the Czech, Hungarian, and Polish currencies were overvalued in early 2005. Simulations, conditional on large-model macroeconomic projections, suggest that under current policies those currencies would be unlikely to stay within the ERM2 stability corridor during 2004-2010. In-sample simulations for Greece, Portugal, and Spain indicate a much smaller misalignment of national currencies prior to ERM2, but a gradual build up of real exchange rate misalignment, repetition of which could impose significant cost on the new, export-dependent member countries.

21B

JEL Classification Numbers: F31, F33, F36, F47

Keywords: Sustainable real exchange rates, foreign direct investment, ERM2

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[1] Aleš Bulíř and Kateřina Šmídková are thankful for the hospitality of the Czech National Bank and the European Central Bank, respectively. The authors acknowledge the support of colleagues at the NIESR. The previous versions of the paper benefited from comments by Ignazio Angeloni, Jan Babetskii, Carsten Detken, László Halpern, Katarina Juselius, Jan Kodera, Louis Kuijs, Kirsten Lommatzsch, Martin Mandel, Alessandro Rebucci, and participants at seminars at the European University Institute, International Monetary Fund, Prague University of Economics, Czech National Bank, and European Central Bank.

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Lee shore (n.) A shore toward which the wind blows
and toward which a ship is likely to be driven.

I. INTRODUCTION

The accession, in May 2004, of ten countries to the European Union (EU) brought closer the euro adoption in these economies. While the long-term, safe-harbor benefits of a single currency have been long accepted, the two practical medium-term questions are when to adopt the euro and what are the still-acceptable costs of the euro adoption. There is no predefined timetable and we argue that an early "race to the euro" may entail substantial economic costs in terms of growing external imbalances and real exchange rate misalignment. This is what we mean by the dangers of the lee shore—ships are more likely to get wrecked while trying to get inside the harbor than sailing in the open sea. The winds blow toward the shore and all want to anchor the ships at the mole, but is the rush worth the risk? What if the country will have to start all over again if failing the conditions or, worse still, enter at a wrong parity, with under- or overvalued currency?

Formal euro adoption rules do not necessarily ensure a smooth convergence. Under the Maastricht rules, to qualify for eurozone membership, a country must achieve a high degree of price stability, keep its government finances sustainable (in terms of the public deficit and public debt), and maintain a stable exchange rate and convergence in long-term interest rates. In addition, prior to adopting the euro, a country must also be a member of the Exchange Rate Mechanism (ERM2) for a minimum of two years.[2] These formal requirements are, however, insufficient to prevent macroeconomic difficulties in sustaining the ERM2 regime if the countries were to enter with domestic currencies appreciating in real terms, misaligned

[2] The European exchange rate mechanisms (ERM) was a system introduced by the European Community in March 1979, as part of the European Monetary System (EMS), to reduce exchange-rate variability and achieve monetary stability in Europe, in preparation for Economic and Monetary Union and the introduction of a single currency, the euro. In 1999, ERM2 replaced the original ERM. The Greek and Danish currencies were part of the ERM2, but as Greece joined the euro in 2001, the Danish krone was left as the only participant member. Following the EU membership, the Estonian kroon, Lithuanian litas, Slovenian tolar, the Cyprus pound, the Latvian lats and the Maltese lira were included in the ERM2 in 2004 and 2005.

currencies, with weak policies, or all three. Moreover, we discount the often-cited argument for a speedy adoption that waiting for the inevitable is pointless. For example, we do not see any evidence of the euro-laggards being punished by foreign investors.

The public debate about the adoption of the euro in the new EU countries has been framed by two main views. First, the euro skeptics have argued for opting out—in their view the net present value of relative costs of euro adoption—compared to the float—outweighs the long-term benefits of euro. However, all the new countries have accepted the obligation of eventual euro adoption. Second, the euro optimists have argued that the two-year Exchange Rate Mechanism (ERM2) and the subsequent peg vis-à-vis the euro can be accomplished easily, with little or no cost relative to the float. The examples of Greece, Portugal, and Spain—the forerunners—have been used to highlight the easiness of euro adoption. While the skeptics have demonized the euro, the optimists have trivialized the transition cost of euro adoption. This paper attempts to quantify some of those costs under a set of reasonable assumptions.

Ours is a hypothetical exercise: what was likely to happen, had the new EU countries started the process of euro adoption on January 1, 2005, that is, fixed the exchange rate vis-à-vis the euro and maintained the inflation criterion. In reality, the tolar has already entered the ERM2 and this exercise is less hypothetical for Slovenia than for the Czech Republic, Hungary, and Poland. Even though all the countries in question would not, and could not, introduce the euro in two years time, we can ask what would have been the cost—that is, real exchange rate misalignment—of doing so.

We estimate sustainable real exchange rates using a set of economic fundamentals: net external debt, the stock of net foreign direct investment, terms of trade, international interest rates, and domestic and external demand variables. Real exchange rate appreciation/depreciation is reflected primarily in larger/smaller accumulation of external liabilities and the real exchange rate is deemed sustainable to extent that net exports can support the sustainable trajectory of debt. Just like any model of equilibrium real exchange rates, this approach provides model-specific results that differ from those based on alternative approaches. Our estimates of sustainable real exchange rates (SRER) are conditional on the structure of our model and on macroeconomic projections from the National Institute Global Econometric Model (NIGEM).

The paper uses the SRER estimates in two ways. First, a gap between the observed real exchange rate and the estimate of the SRER signals a currency misalignment. The misalignment

need to be corrected by a change in the exchange rate, external environment, unsustainable macroeconomic policies, or all three. Second, a medium-term SRER projection outside of the ERM- and Maastricht inflation corridors signals external disequilibrium. The authorities can either adjust the exchange rate or, under a fixed regime, adjust macroeconomic policies. The main cost of protracted disequilibrium is accumulation of external debt and, consequently, a higher risk of a currency attack.[3]

Our results indicate a move toward the euro and successful adoption of the new currency will require either tighter fiscal policies than under the float or much faster GDP and FDI-driven export growth—a continuation of current policies under a peg would result in growing external disequilibria and real exchange rate misalignment.[4] There is an element of luck in these projections as well: for example, should German demand for imports increase, all new EU countries are likely to benefit through faster export growth.

Our in-sample simulations of SRER for those countries that adopted the euro in the late 1990s (Greece, Portugal, and Spain) indicate that they did not have problems with currency misalignment. The medium-term path of their real exchange rates was fairly stable and corresponded to the SRER-implied corridors. At present, however, the euro appears to be too strong for their economies and they have gradually accumulated sizable external debt.

Simulations for some of the new EU countries point to difficulties in entering the ERM2 mechanism. Of the four countries (the Czech Republic, Hungary, Poland, and Slovenia) the Czech and Hungarian currencies appeared to be overvalued significantly in 2004 according to our model. Slovenian currency, in contrast, was within the corridors, justifying the fast-tract approach to the ERM2. Looking ahead, the model simulations suggest that, under hypothetical continuation of the current policies, the Czech, Hungarian, and Polish currencies would be unlikely to stay within the narrowly defined ERM2 stability corridors during 2005–2010. For one, the cushion in the form of low external debt will not be available to the latecomers—they

[3] An attack that would push the currency outside of the ERM2 can impose substantial costs; as a minimum, the currency would have to re-enter the ERM2 with all the associated administrative costs.

[4] The external disequilibria in our paper are similar to the results of risk underpricing in the model of Lipschitz, Lane, and Mourmouras (2002).

borrowed heavily to cushion the transformation costs. These findings suggest that an early approach to the lee shore may do more harm than good to some of those countries.

The paper is organized as follows. Section II presents some stylized facts on EU accession countries. Section III outlines a macroeconomic model of real exchange rate and capital stock determination. Section IV shows our empirical results for the second-generation SRER model. Section V suggests some policy implications of our findings, and the final section concludes.

II. FORERUNNERS AND LATECOMERS: ARE THERE LESSONS TO BE LEARNED?

Historically, Economic and Monetary Union (EMU) countries, the forerunners, have been put to several tests before being allowed to adopt the euro and similar hurdles will have to be overcome by the latecomer countries that joined the EU in May 2004 (the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia) and are readying themselves for the euro. How challenging is it going to be to meet those conditions for the latecomers?[5] On the one hand, we see a possible conflict between trend appreciation of real exchange rates and the EMU criteria of low inflation and a stable nominal exchange rate in the Central European countries. On the other hand, there are other issues at stake than the technical criteria of EMU membership: if a currency were to be irrevocably fixed at an improper parity to the euro, the misalignment would have to be adjusted through other, more costly processes, such as domestic price or wage adjustment.

Euro adoption raises multiple questions. Is the period of appreciating and volatile real exchange rates in the new accession countries now over, making EMU entry relatively simple? Or is it likely to continue for a few more years, resulting in potentially costly adjustment in those countries? If the latter is true, would a switch to the euro do harm? If so, how serious would the resulting exchange rate misalignment be? Are the costs of euro adoption, relative to maintaining float, same for all of the new EU countries? Would the economic costs of this misalignment be offset by trade and integration gains from the membership in the eurozone? And what drives these integration gains anyway? To answer these questions, we updated estimates of sustainable real exchange rates presented in Bulíř and Šmídková (2005).

[5] See the European Central Bank (2004) for the current compliance with required criteria.

A. Exchange Rate Developments in the Transition Countries

Our analysis is motivated by a few stylized facts regarding the four Central European countries with flexible exchange rate regimes that joined the EU in May 2004 and which we will call the "latecomers." We focus on the Czech Republic, Hungary, Poland, and Slovenia because they have consistent data and country models are available from the NIGEM.[6]

First, the currencies in those countries have appreciated substantially in real terms during the last decade (Figure 1). Between 1992 and 2004 the real exchange rates in the new accession countries, with the exception of Slovenia, appreciated substantially. A part of this appreciation was attributable to excessive devaluation at the start of the transition process (Halpern and Wyplosz, 1997). Second, most empirical papers agree that rising total factor productivity in the tradable-good sector (the Balassa–Samuelson effect) does not explain fully the gradual and long-lasting real exchange rate appreciation in transition countries.[7]

Third, the observed appreciation cannot be explained away by the traditional argument of external wealth accumulation (Lane and Milesi-Ferretti, 2002). According to that hypothesis, countries with sizable external liabilities need to run large trade balance surpluses to service those liabilities and, consequently, positive net exports require a "competitive," depreciated real exchange rate. Contrary to the theory, transition economies, with the exception of Slovenia, have piled up external liabilities—their net foreign assets are negative and increasing—and, at the same time, have run persistent trade deficits accompanied by real exchange rate appreciation.

Fourth, most transition countries have received massive inflows of foreign direct investment (FDI) that may have affected investors' perceptions about the countries' long-term sustainable external balances. Assuming that export growth and productivity improvements are driven by FDI—as compared to competitiveness of national exchange rates—contemporaneous capital

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[6] NIGEM is a large New-Keynesian macromodel and simulation environment prepared by the National Institute of Economic and Social Research, London. For a description see National Institute of Economic and Social Research (2003) and Barrell *et al.* (2002). NIGEM contains country models of five accession economies, external sector of which is similar to our model in Section IV. Of those five countries we omitted Estonia, chiefly on the account that it has fixed its currency vis-à-vis the euro from 1999.

[7] See, for example, De Broeck and Sløk (2001), Égert (2002), Mihaljek (2002), Flek *et al.* (2003), Égert and Lommatzsch (2003) and Cincibuch and Podpiera (2004).

inflows may signal expected future net export gains consistent with appreciated real exchange rates. The simple relationship between the increase in the stock of FDI and improvements in the trade balance in goods in suggestive—countries with the biggest FDI accumulation export more than those with small FDI accumulation (Figure 2). Thus, we see foreign direct investment as the main culprit in explaining the real exchange rate appreciation, which is otherwise at odds with the observed Balassa–Samuelson and external-wealth accumulation effects. This hypothesis is consistent with previous empirical work related to foreign direct investment in transition countries (Lansbury *et al*., 1996, and Benáček *et al*., 2003).

Those countries that joined the EU in the 1980s—Greece in 1981 and Portugal and Spain in 1986—and which we will call the forerunners, had had a turbulent past as well. They missed out on early EU entry because their then political regimes made them incompatible with joining and their road to the euro was quite long—20 and 13 years respectively. Prior to adopting the euro, the forerunners appeared to fit a similar pattern of stylized facts as the new accession countries. The forerunners' real exchange rates appreciated during the ten years prior to joining the EMU, their net external liabilities increased, partly reflecting FDI inflows, and current account deficits widened.

B. The Concept of Sustainable Exchange Rates and Accession Countries

The concept of a sustainable real exchange rate, which goes back to the research of Artus (1977), can be used for accession-country exchange rate assessment in two ways. First, as a measure of misalignment of historic real exchange rate series. Second, as a forward-looking measure of real exchange rate stability in the run-up to euro adoption. The empirical results of real exchange rate misalignment are mixed and often contradictory, depending to a large extent on the method chosen, the two main approaches being single-equation, time-series based estimates and normative-target based models.[8]

Authors employing the single-equation, cointegration approach assume that the real exchange rate's return to its equilibrium value is directly observable. This might be a reasonable assumption for 30-year-long series of industrial-country exchange rates, but it is less so for short, transition-country series that have moved in one direction only. In contrast,

[8] For a review see, for example, Égert (2003), Égert, Halpern, and MacDonald (2004), Bulíř and Šmídková (2005), and Driver and Westaway (2005).

normative-target based estimates originating in the work of Williamson (1994) allow for disequilibrium that is both unobservable from the actual data and long-lasting—real exchange rate developments can be driven by a notional current account or external debt targets.

Empirical papers, especially those based on the time-series, single-equation approach, have been inconclusive with respect to the direction of currency misalignment. While currencies were find overvalued using one set of variables, they were often found balanced or undervalued in another. The puzzling ambiguity was explained by Driver and Westaway (2005), who found that alternative methods of computing equilibrium real exchange rates work with different time horizons and hence most of the differences can be explained away by the horizons of the individual studies. Long-term studies have found transition country currencies typically undervalued, whereas medium-term studies have found them mostly overvalued. By choosing different measures of external equilibrium or different speeds of disequilibrium adjustment, the resulting estimates of real equilibrium rates can change easily. We thus remain doubtful about the policy relevance of results based on the single-equation approach.

Normative-target based estimates are much less dependent on the horizon of the study, even though they remain sensitive to the choice of target variables. At least, and in contrast to the cointegration approach, the sensitivity of exchange rates to the choice of the target variable can be explicitly measured. For example, Spatafora and Stavrev (2003) estimated a model with a current account target, finding that, based on alternative assumptions of the international oil price and trade elasticities, the Russian ruble is either valued fairly or undervalued by up to 40 percent. Coudert and Couharde (2002) based their estimates on current account and output gap targets, concluding that in 2001 the Czech, Estonian, Hungarian, Polish, and Slovenian currencies were all very close to their equilibrium values. Šmídková *et al*. (2002) estimated a model with a fixed external debt target of 60 percent of GDP for the Czech Republic, Estonia, Hungary, Poland, and Slovenia and found that all currencies but the Slovenian tolar were overvalued in 2000–2001 to the tune of 5–10 percent.

The empirical literature to date has focused much less on the issue of real exchange rate stability in the run-up to euro adoption. Égert (2002) concluded that real exchange rate volatility is not likely to pose a problem and that accession countries should enter the ERM as quickly as possible. Šmídková *et al*. (2002) were much less optimistic, foreseeing significant volatility

unrelated to the underlying fundamentals. We will explore this issue in the empirical section as well.

III. A Model of FDI-Driven Real Exchange Rates

We have developed a simple dynamic model of a small, open economy, the real exchange rate developments of which are affected by foreign direct investment. In the remainder of the paper we will try to quantify the role of foreign direct investment and external debt in explaining real exchange rate developments in the new accession countries.[9] To motivate the empirical estimates, we begin by outlining FDI has exercised a powerful effect on transition economies, both by stimulating aggregate supply and by raising permanent income. The two main channels of the impact of FDI on growth are well researched: first, through an increase in total investment and, second, through interaction of the FDI's more advanced technology with the host's human capital (Lim, 2001). To the extent the latter channel affects sectoral productivity, it is akin to the Balassa-Samuelson effect. The literature has offered, however, limited agreement on the quantitative importance of those effects.

In our model—which resembles that of Blanchard (1981)—FDI is equally productive as domestic capital, contributing to capital accumulation. The impact of FDI can be modeled through standard money- and goods-equilibrium schedules, a classical production function, and uncovered interest parity. Output is increasing in the stock of foreign direct investment, above and beyond the increase in the capital stock, primarily because FDI generates substantial productivity spillovers outside of its sectoral allocation. The IS curve can be thought of as a demand schedule, while on the supply side physical output is governed by a classical production function. Capital accumulation is assumed to be decreasing in the existing stock of capital, the real interest rate, and, owing to crowding out, in total debt.

Latecomer countries that have suboptimal capital stock accumulate capital faster than advanced countries with an optimal capital stock. Once the capital stock approaches its optimal level, the accumulation process slows down. Total debt is constrained in a debt accumulation schedule, where total debt is accumulated by FDI inflows and fiscal deficits, decrease with domestic

[9] See Appendix in Bulíř and Šmídková, 2005 for the algebraic solution of the model. The model does not incorporate any common-currency effect on trade and income (Bun and Klaasen, 2002) as the integration of the accession countries with their EU trading partners has progressed towards the EU levels. Therefore, a common currency itself is not likely to bring a major integration gain.

growth, and is predetermined by its initial level. In other words, we assume that foreign investors care about the transition country's growth prospects, return on FDI, and overall prospects of servicing its obligations (Campos and Kinoshita, 2003 or Bevan and Estrin, 2004). It is reasonable to assume that the other commonly used determinants of FDI inflows (lower wages, market attractiveness, "cultural distance," and so on) are met in the countries in question. The model is closed with uncovered interest parity. The model is reduced to two differential equations—one for the capital stock and the other for the real exchange rate—that describe the impact of exogenous shocks in the capital-exchange rate space.

We consider a few plausible shocks and their impact on the capital stock and real exchange rate. First, an unexpected permanent increase in foreign direct investment will affect both the real exchange rate and the capital stock, as their stationary lines move south, to $\dot{c}' = 0$ and $\dot{k}' = 0$ respectively (Figure 3.). As a result, at equilibrium the domestic currency appreciates. The real exchange rate appreciation will be instantaneous, with some overshooting, and the capital stock will decline marginally owing to the FDI shock. Hence, the first round output and net-export effect is negative, depending on the size of the real exchange rate and FDI parameters in the *IS* schedule. The stock of capital will continue increasing, however, and the larger capital stock will boost output, partly offsetting the real appreciation. These features seem to be consistent with the growth pattern of Central European transition countries.[10]

The model above offers a sensible if necessarily simplified description of the various channels through which FDI affects the economy. First, we note the additional growth effect from FDI inflows. Second, we observe that the FDI-real exchange rate nexus can dominate the net-foreign-asset nexus of exchange rate determination. Third, the associated real appreciation may offset some of the integration gain. Fourth, the model shows that FDI-dependent economies are vulnerable to changes in their indebtedness.

[10] The model lends itself to a number of alternative scenarios, some of which we explored in Bulíř and Šmídková (2005). For example, an increase in initial debt will affect only the real exchange rate schedule through a drain on the external current account, gradually appreciating the currency and lowering the equilibrium capital stock through FDI outflow. Steady-state output declines both because larger debt crowds out future investment and the domestic currency appreciates, following the higher interest rates.

IV. EMPIRICAL EVIDENCE

We limit the normative-target estimates of sustainable real exchange rates to three forerunners: Greece, Portugal, and Spain, and four latecomers with *de jure* floating exchange rates: the Czech Republic, Hungary, Poland, and Slovenia. After outlining the empirical model, we rationalize our choice of calibrated parameters, and present the results. The selected approach defines the external balance in terms of stocks rather than flows and emphasizes the role of foreign direct investment as the decisive factor in fundamental-based real exchange rate appreciation. The data are drawn from the NIESR and IMF databases.

A. The SRER Model

The empirical model

The theoretical model outlined in Section III could be calibrated and simulated, and we would compare the trajectories of debt, trade and other variables under flexible and fixed exchange rates. However, we see large benefits of simplifying the framework by treating FDI, trade developments, and growth as exogenous vis-à-vis the model. Rather than exploring the different equilibrating mechanisms under floats and pegs, which are well known, we test how the equilibrium exchange rate would change if only the exchange rate regime changed. Is it true, as the pragmatists have argued, that the switch from float to peg should not matter? If it would matter, how serious the resulting real exchange rate misalignment could be?

Hence, we take all future macroeconomic variables, such as demand and trade variables, from the NIGEM database as projected under the assumption of flexible exchange rates and focus on a single hypothetical question: how would the trajectory of the real equilibrium exchange rate change if the nominal exchange rate were to be fixed on January 1, 2005? As explained below, we allow changes to the external debt path and trade flows, but no feedback from real overvaluation to FDI, trade developments, or growth can take place. Moreover, we allow the misalignment vis-à-vis the equilibrium rate to be long-lasting.

The normative-target, SRER framework has been built around econometric trade equations relating exports and imports to fundamental variables such as the real exchange rate, the terms of trade, external debt, and domestic and foreign economic activity. The SRER model differs from its predecessors in several aspects. First, the FDI-driven integration gains are incorporated directly into the model in a manner similar to Égert and Lommatzsch (2003). Second, the current

account balance is not restricted, as it is asset and liability stocks, not flows, that define the external equilibrium. The sustainable level of external debt is defined according to openness to trade. Third, all variables exogenous to the SRER are modeled within an underlying model framework (NIGEM), ensuring consistency and interdependency. Exports increase with the stock of foreign direct investment (FDI) to approximate the integration gain.[11] Exports also expand with foreign demand and improvement in the relative price of domestic goods either through real depreciation or a terms of trade change (the real exchange rate being defined in terms of the relative import price):

$$(7) \qquad X = \alpha_0 . \left(\frac{EP_m}{P} \right)^{\alpha_1} . \left(\frac{P_x}{P_m} \right)^{\alpha_1} . \left(Y^* \right)^{\alpha_2} . F^{\alpha_3} ,$$

where X denotes an export index; E is the US dollar nominal exchange rate vis-à-vis the domestic currency; P_m and P_x stand for the effective price of imports and exports, respectively; P is the domestic consumer price level; Y^* denotes foreign demand; and F measures the stock of the FDI-to-GDP ratio. Parameters $\alpha_1 - \alpha_3$ have expected nonnegative values.

Demand for imports is driven by domestic activity, the real exchange rate, and the FDI stock:

$$(8) \qquad M = \beta_0 . \left(\frac{EP_m}{P} \right)^{\beta_1} . Y^{\beta_2} . F^{\beta_3} ,$$

where M denotes an import index and Y is domestic output. Parameters β_1 and $\beta_2 - \beta_3$ have negative and positive expected values respectively. Moreover, for the integration gain $\alpha_3 > \beta_3$ must hold, that is, the stock of FDI improves net exports.

The trade balance, external borrowing, and net external debt interest payments determine the level of net external debt in any given period. External debt, however, is not an unbounded variable—for a given rate of growth and initial real exchange rate a unique path of sustainable external debt is predetermined. At the same time, accession countries try to exploit fully the

[11] The FDI parameter uncertainty is reflected in the size of the confidence interval. Naturally, the quantitative impact can differ from country to country, depending in the short run on the import component of FDI and in the medium term on whether the new technology produces exportable goods or substitutes for imported goods. Moreover, measurement problems persist in the recording of various FDI components, such as reinvested profits.

maneuvering space of sustainable debt, as FDI inflows bring about the integration gain. In the SRER framework the path of sustainable debt can be approximated by considering the initial stock of debt and the country-specific sustainable debt target for the end of the simulation period.

To the extent that it is not possible to determine the debt target within the underlying model, we base the targets on selected measures of external sustainability:

$$(9) \qquad D^* = \delta\left[D_0, D_T\right],$$

where D^* denotes the sustainable path of net external debt (in the domestic currency, ratio to GDP), and D_0 and D_T are the initial and target levels of net external debt.

A solution for sustainable real exchange rates reflecting the above economic fundamentals can be found simultaneously using equations (7–9):

$$(10) \quad \left[\bar{M}.\beta_0.\left(C^*\right)^{\beta_1}.Y^{\beta_2}.F^{\beta_3} - \bar{X}.\alpha_0.\left(C^*\right)^{\alpha_1}.\left(\frac{P_x}{P_m}\right)^{\alpha_1}.S^{\alpha_2}.F^{\alpha_3}\right] = \left(1-r\right)D^*.Y - D^*_{-1}.Y_{-1}$$

where C^* is the sustainable real exchange rate; $\bar{M}$ and $\bar{X}$ are the volumes of real imports and exports, respectively, in the base year, respectively; and r is the world real interest rate.

Parameter calibration

The parameters used in equation (10) have been calibrated using panel-data results from Barrell *et al.* (2002) and Šmídková *et al.* (2002) (Table 1). We note that, first, the integration gain $\left(\alpha_3 > \beta_3\right)$ is significant: a one-percentage point increase in FDI increases net exports by almost 0.5 percent. Second, the FDI elasticities of exports and imports are somewhat higher than the estimates for Ireland, the United Kingdom, Germany, France, Sweden, and the Netherlands (Pain and Wakelin, 1998). Third, the exchange rate elasticity of exports is higher for the latecomer economies than for developed economies alone, reflecting underlying structural and institutional differences between those two groups of countries.

We incorporate a trade-based, country-specific definition of net external debt target, values of which that are binding in 2022 (Table 2), whereas the earlier models assumed a fixed target equal to 60 percent of GDP (Ades and Kaune, 1997). Recent events have shown that the rule-of-thumb approach may not be flexible enough, sustainable external debt ought to be

related to countries' ability to service it (International Monetary Fund, 2002), and uncertainty related to the target can be large. Nevertheless, the impact of changes in the sustainable debt-to-GDP ratio on the SRER estimates is relatively small: a 10-percentage point change in the ratio generated a change in the equilibrium real exchange rate of 0.04–0.4 percent only.

Data issues

Data consistency is crucial for the SRER calculations, given the endogenous relationship between various variables, such as domestic and foreign demand or trade and financial flows. We rely on the global econometric model (NIGEM) maintained by the National Institute of Economic and Social Research, which allows us to project domestic and external within the same model (Table 3). Our model experiment is based on an unconditional forecast—we implicitly assume that the NIGEM projection represents the optimal trajectory of macroeconomic developments.

Simulation techniques and result uncertainty

We solved equations 7–10 in the WinSolve 3.0 (2003) simulation package, using the Newton procedure. Most data are derived from the NIGEM database, while some historical series were supplanted with IFS data. For off-sample simulations NIGEM projections were also used. Hence, the only variable simulated in equation (10) is the sustainable real exchange rate. All other projected variables are treated as exogenous vis-à-vis our model. For each country, baseline SRERs are calculated by solving equation (10) for the period 1995Q1:2010Q4. Input variables are set equal to the observed values for the in-sample computations (1995Q1–2004Q4) and to the forecasted values for the out-of-sample computations (2005Q1–2010Q4).

As with all simulations, the SRER estimates are useful only to the extent that we can be confident about their significance. Economists are generally faced with two basic uncertainties. While parameter uncertainty is reflected in the width of the confidence interval, the more serious of the two, model uncertainty, is best addressed by applying the model to different countries and/or periods. We performed both extensive sensitivity tests and comparisons with other papers assessing the real exchange rates of accession countries. (The results of the sensitivity tests are available from the authors upon request.) Regarding the former, confidence intervals are calculated for both the in-sample and off-sample (projection) periods. While the in-sample confidence intervals are simulated using the estimation errors of the trade equations, the off-sample confidence intervals are based on the historical standard errors of the exogenous

variables and the uncertainty about the target value of the external debt (D^*). As far as the precision of our estimates is concerned, we found confidence bands of a similar order as compared to other studies on fundamental real exchange rates.[12] Regarding model uncertainty, we compared our results with recent medium-term studies surveyed in Égert and Lommatzsch (2003) and found that our estimates of misalignment were of similar sign and magnitude. We acknowledge, however, that the current literature offers no definitive way of determining the true model of equilibrium real exchange rates.

B. Forerunners: Test-Driving the Model

Before applying our framework to the new EU countries, we tested the model on the sample of the three forerunners: Greece, Portugal, and Spain. The Portuguese escudo and Spanish peseta re-entered the ERM in 1996, whereas the Greek drachma joined in 1998. Following a two-year period of nominal-convergence assessment, these countries adopted the euro in 1999 and 2001, respectively. We ask the following question: did the change in exchange rate regime affect external equilibrium and cause misalignment? To answer this forward-looking question, we simulate equation 10 using the relevant data, obtaining an estimate of the real equilibrium exchange rate as well as estimates of the confidence intervals (the SRER corridor).

We find that, first, all forerunners started their ERM membership with fundamentally correct parities vis-à-vis the euro and, second, prior to euro adoption, their parities appeared sustainable for two years ahead of the ERM (Figure 4). Regarding the former, the peseta was slightly undervalued and the drachma and escudo were within their SRER corridors. Regarding the latter, the drachma remained broadly in line with the equilibrium rate predicted by the model,[13] whereas the euro was some 10–20 percent too strong in real terms for Portugal and Spain. In summary, the model indicates that the forerunners entered both the Exchange Rate Mechanism and the eurozone at the right time and with the right parity.

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[12] For example, Detken *et al*. (2002) estimate the uncertainty of the equilibrium real exchange rate of the euro at around 20 percent.

[13] It is worth remembering that Greece took full advantage of two rather unique circumstances. First, it joined ERM2 with a central parity some 12 percent weaker than the market rate at that time. Second, the central bank was subsequently able to engineer a steady depreciation of the market rate.

Post-adoption developments suggest increasing external imbalances. Real appreciation vis-à-vis the SRER appears to be persistent, with no signs of abating—in early 2005 the euro seemed too strong for all three countries to the tune of 10-15 percent. During 2004 exchange rate misalignment increased as inflation accelerated and the rate of growth fell short. While we do not speculate about the direction of causality, it could be argued that inflation has been driven by the weak fiscal stance in Greece and Portugal or that growth slowed as a result of worsening competitiveness (Figure 2 shows a widening trade deficit in all three countries). Needless to say, these findings seem broadly consistent with the trade and debt developments in the forerunner countries as discussed in IMF country reports (http://www.imf.org/external/country/index.htm).

What does the forerunners' "smooth sailing" in the run-up to euro adoption and the subsequent "maneuvering close to the lee shore" imply for the latecomers' entry into the eurozone? The results will depend on two conditions. First, on the initial real exchange rate misalignment and, second, on the volatility of the latecomers' macroeconomic forecasts vis-à-vis the actual developments in the forerunner group. On the one hand, the latecomers' misalignments in the mid-2000s seem larger that in the forerunners' group in the mid-1900s. Moreover, historic real exchange rate volatility has been was much lower in the latter group, mostly as a result of tightly managed nominal exchange rates in the run-up to euro adoption. Moreover, Portugal and Spain entered the ERM during a period of relative tranquility on international financial markets. On the other hand, the average export-to-GDP ratio in the Czech Republic, Hungary, and Slovenia is almost 60 percent, as compared to less than 30 percent in Greece, Portugal, and Spain, presumably lowering the exchange rate volatility.

We also noticed some post-ERM developments in the forerunner countries that would have interesting implications for the latecomers. First, the stock of net FDI declined or stagnated following the adoption of the euro, both owing to a slowdown in FDI inflows and an increase in FDI outflows (Figure 1). Should an FDI slowdown occur in the latecomer countries, it would generate two processes. On the one hand, it would depreciate the equilibrium exchange rate even more, hence, increasing the misalignment. On the other hand, it would limit the expected integration gain, restricting real convergence and abating or reversing the current export boom in the latecomer countries. Second, the adoption of the euro accelerated the forerunners' accumulation of foreign liabilities, which was possible because the stock of debt was initially low and certainly lower than in the latecomer countries at present (Figure 1).

C. Computational Results for Sustainable Real Exchange Rates in the New EU Countries

In this section, we will provide three sets of empirical results for the Czech koruna, Hungarian forint, Polish zloty, and Slovenian tolar. First, a measure of the misalignment of real exchange rates. Second, a forward-looking measure of real exchange rate stability in the run-up to euro adoption, conditional on NIGEM macroeconomic forecasts. Third, an assessment of "euro readiness" over time by comparing 2003 and 2005 vintages of the SRER model. The results of these tests—conditional on NIGEM macroeconomic projections—are not commensurate with an early ERM2 entry for the Czech Republic, Hungary, and Poland. In contrast, Slovenia seemed to have entered the ERM2 at an appropriate moment.

Misalignment

We find that two out of the four accession currencies were significantly above their fundamental-based equilibrium exchange rates at end-2004 (Figure 5). Fixing the euro conversion rates at the end-2004 exchange rates and without major policy adjustments to reverse the slide in fundamentals would have posed a major immediate problem for the forint and koruna (in that order), but not for the tolar and zloty. Even if we disregard the numerical values of the estimated misalignment—after all, our estimates have fairly wide confidence intervals and depend on post-2005 projections of macroeconomic variables—the recent developments signal a significant break with the late 1990s, when the misalignment was small and not statistically different from zero.

On average, the fundamentals explained about 60 percent of the real appreciation during the last decade. We can only conjecture what might explain the rest. Some obvious culprits include excessively optimistic expectations about the speed of real and nominal convergence (risk mispricing), a temporary impact of privatization inflows, and the psychological effect of EU enlargement. And part of the misalignment is possibly due to medium-term volatility of nominal exchange rates.

In our model the koruna and forint were found to be overvalued, and these results were statistically significant, while the tolar and fairly recently also the zloty appears to be in line with the fundamentals. The Czech koruna, from a minor undervaluation during 1995–1997, appreciated sharply in 1999 to 5 percent above its fundamental-based value and the level of overvaluation stabilized at around 15 percent in 2003-2004. The movement is largely explained by accumulation of external liabilities and nominal appreciation, although part of the

misalignment was corrected through expansion of exports and lower international interest rates (debt service is smaller than previously). The Hungarian forint, which has been was more volatile than the other currencies in our sample, remained close to its equilibrium value until end-2000: although net foreign assets were improving, FDI stagnated. Starting in 2001, the forint appreciated to 40-percent above its fundamental value, mostly on the account of fiscal profligacy and commensurate accumulation of external liabilities.

Of the two countries close to the SRER, the Polish zloty was close to its fundamental value until early 2000, but the estimated misalignment reached some 15–25 percent in 2002 as the accumulation of external liabilities has increased. The recent return of the zloty to the equilibrium value reflects fiscal stabilization, booming exports, and lower inflation. The Polish authorities seem to be quite serious about the euro. The Slovenian tolar, after a protracted period of minor real undervaluation, seemed to be in line with its fundamentals at the end of 2004. More than anything else, Slovenian fundamentals were stable compared to the other newcomers and the country has begun its preparation for ERM2.

Sustainability

Long-term perspectives of the newcomer currencies are not particularly promising. We find that in our model the nominal convergence required by the Maastricht criteria and ERM2 may prevent the currencies—at their end-2004 levels—from either converging toward their equilibrium real exchange rates or staying within the SRER corridors. Fixing these currencies and assuming five more years of current macroeconomic policies—as projected by NIGEM—would still not stabilize the currencies close to their fundamental equilibrium. In other words, floating-regime policies would not be good enough for fixed-regime environment of the ERM2. Thus, we remain doubtful about the euro optimists' claim of costless move from one regime to another.[14] Formally, we compare the estimated SRER confidence bands with the so-called

[14] ERM2 permits nominal exchange rate fluctuations within a ±15 percent band. This requirement differs from the exchange rate stability criterion, which requires "the observance of the normal fluctuation margins provided for by the Exchange Rate Mechanism of the European Monetary System, for at least two years, without devaluing against the currency of any other Member State" (Article 109(j) of the Maastricht Treaty, http://www.eurotreaties.com/maastrichtec.pdf). On an operational level, however, the criterion was set as fluctuation margins of ±2 ¼ percent against the median currency (EC Convergence Report 2004). The latter implies obviously a much tighter regime than the former.

"stability corridors" that are to reflect the convergence criteria for both for inflation and exchange rate stability (Figure 6).[15]

While some newcomer currencies are projected to remain overvalued, others are projected to become undervalued. First, in the 2005–2010 period we find the SRERs appreciating in all four countries (the SRER corridors are sloping downward). Second, the koruna and forint stability corridors are converging toward the equilibrium exchange rate, however, the forint remains far away from the implied ERM2 corridor and, hence, at odds with the ERM2 entry date toward the end of the decade.[16] In the case of the koruna, the SRER and stability corridors converge toward the end of the decade. Third, the results for the tolar and zloty suggest the opposite scenario—these currencies would need a modest revaluation toward the end of the decade. The SRER and stability corridors are diverging from the current alignment.

In summary, our model findings suggest that close sailing toward the lee shore, that is, an early entry into the ERM2 and meeting of the Maastricht criteria may do more harm than good to the latecomer countries. At present, some currencies seem to be overvalued and some close to equilibrium, but none of them is projected to remain safely within the SRER corridors during the period ahead. Our assessment is complicated by the fact that we do not really know where the lee shore lies—would the ECB apply the narrow corridor for exchange rate fluctuations or the wide one? The choice of the corridor matters for all countries, but especially for the koruna and zloty, both of which happen to be staying within the wide corridor, but not the narrow one (Figure 6).

Maneuvering Along the Lee Shore

An interesting question is whether the currencies under consideration are getting closer to equilibrium or away from it. We find that our most recent simulations yield somewhat more optimistic results compared to the results prepared two years ago (Figure 7). Specifically, we compare the center point of the 2003 and 2005 vintages of our SRER estimates and their

[15] A word of caution about direct comparisons of Figure 4 and 6: while the former is based on historical data, the latter is based on projected data series that incorporate modeling simplifications.

[16] The date pre-announced by the Czech, Hungarian, and Polish authorities is based, however, on the fiscal Maastricht criteria, namely that of an overall fiscal deficit of no more than 3 percent of GDP. Equilibrium exchange rate calculations did not seem to be a part of this decision.

differences vis-à-vis the implied stability corridors of the real effective exchange rates.[17] The koruna is now projected to be closer to the implied corridors by the end of the 2000s than what the model projected in 2003. The forint is projected to remain substantially overvalued. The projection for the zloty changed the most: while the zloty was estimated to be overvalued by 2010, the latest run of our model suggest that it may require revaluation at that time. Tolar's equilibrium appreciation is projected to continue and the currency may require revaluation by the end of the 2000s.

What explains these changes? Are the authorities making some effort to meet the stringent ERM2 criteria as recommended by Schadler et al. (2004)? Or are they helped by favorable changes in the external environment? It appears that the improvement could be mostly attributed to positive external shocks—perhaps with the exception of Poland, where the authorities tightened their policies measurably. First, larger-than-projected FDI inflows appreciated the SRER in the Czech Republic and Poland. Second, recovery in the euro area increased demand for and price of latecomers' exports, appreciating the equilibrium real rates in all countries. Third, lower international interest rates lowered debt service, relieving some of the depreciation pressure. While these positive exogenous shocks make the sailing along the lee shore less risky, they could also make the authorities more complacent about the future.[18]

V. Policy Implications and Conclusions

The paper outlines a simple theoretical model of sustainable real exchange and simulates it on a sample of three "forerunners" and four new accession countries using time series from the NIGEM database. The model is tailored to the conditions of the new EU countries and provides an alternative to the existing models. The primary impact of external disequilibrium in this model is accumulation of debt. The observed real exchange rates are then compared with simulated real equilibrium exchange rates based on assumption that the nominal rates to the euro were fixed at certain point in time. We draw the following conclusions:

[17] For the sake of clarity, we omit the associated confidence intervals. Given the width of these intervals, the differences between the 2003 and 2005 results are not significant in the statistical sense.

[18] The published accession strategies in the Czech Republic and Hungary seem to rely mostly on backloaded measures, effect of which will not be felt until the second half of the 2000s.

- According to our model, early adoption of the euro by the latecomer countries is unlikely to be as smooth as that by the forerunner countries given current macroeconomic policies and the external environment. While facing stabilization dilemma, the latecomer countries have a smaller cushion in the form of sustainable indebtedness.
- *Ex post* simulations for those countries which accepted the euro in the late 1990s—Greece, Portugal, and Spain—show no real exchange rate misalignment of their national currencies at that time, even if they appreciated subsequently. Moreover, prior to euro adoption their real exchange rates followed a more stable, medium-term path than can be expected in the new EU countries.
- Post-ERM developments in the forerunner countries provide a key lesson for the latecomer countries—following the adoption of the euro, the convergence problems do not disappear. First, the stock of net FDI either declined or stagnated following the adoption of the euro, both owing to a slowdown in inflows and an increase in outflows. Second, the convergence process was driven by the forerunners' accumulation of foreign liabilities, which was possible because their initial stock of debt was comparatively low.
- Sailing toward the lee shore on an identical course with the fast sailors would seem like a dangerous course for some of the less seaworthy countries. After EU enlargement, real exchange rates were not close to their fundamental-based values and an immediate fixing vis-à-vis the euro would have resulted in overvalued currencies in the Czech Republic and Hungary, but not in Poland. Slovenia, which has already introduced ERM2, has done so appropriately according to our model. From a medium-term perspective, meeting the convergence tests for exchange rate and price stability would be costly, owing to the only gradual convergence of equilibrium real exchange rates toward the narrow band. But then again, many a daring captain made a successful dash for the harbor brushing the shore with his ship.
- What would need to be done to achieve convergence in our model? Either growth and export performances would have to improve substantially compared to our model or their macroeconomic policies—fiscal deficits and external borrowing—would have to be tightened.

- External factors affect strongly the simulations of the sustainable real exchange rates. Recovery in the euro area has led to exogenous increases in demand for the new EU countries' goods and lower international interest rates have lowered debt service, relieving some of the depreciation pressure. We see a risk that some countries may view these positive shocks as a permanent change in the external environment, relaxing their reform efforts and policy stance.
- Comparing the current simulations with previous runs, we find somewhat more optimistic picture in the latecomer countries than before and the reasons for improvements are easy to pin down. The external environment of ample global liquidity has been favorable to emerging market countries. Latecomer countries have also experienced major terms-of-trade improvements and their exports increased more than expected. FDI inflows, and especially inflows into export oriented industries, exceeded expectations, resulting in booming exports and improvements in trade balances.
- At the moment, we do not see any evidence of financial markets penalizing the countries that stay clear of the lee shore and delay euro adoption. On the one hand, the market spreads on Czech and Polish debt are at comparable levels to the fast-sailing countries, with no penalty on FDI inflows. On the other hand, we observe that FDI leveled off in the forerunner countries and has been flat in Slovenia.

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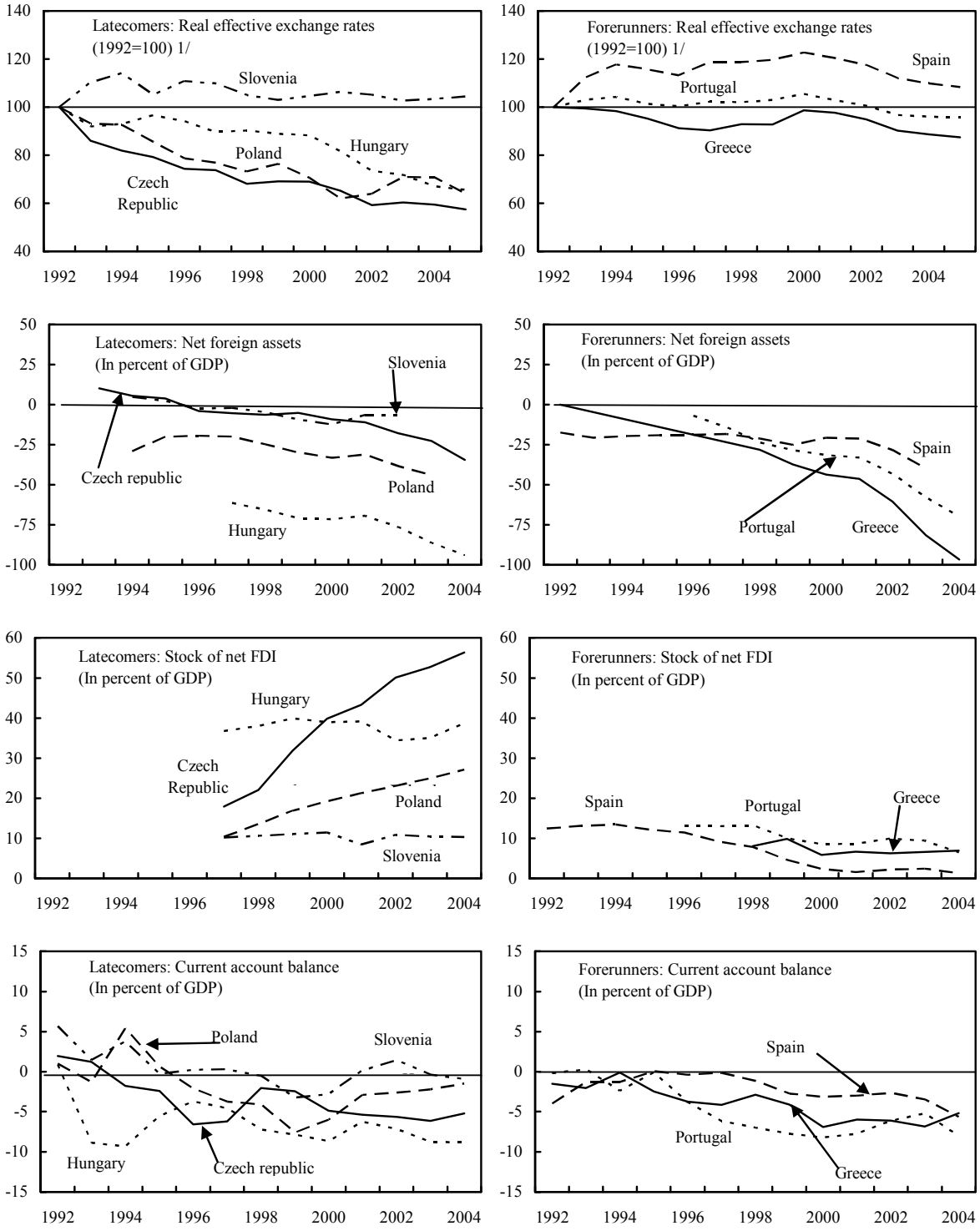
Figure 1. Latecomers and Forerunners: Selected Indicators, 1992-2005

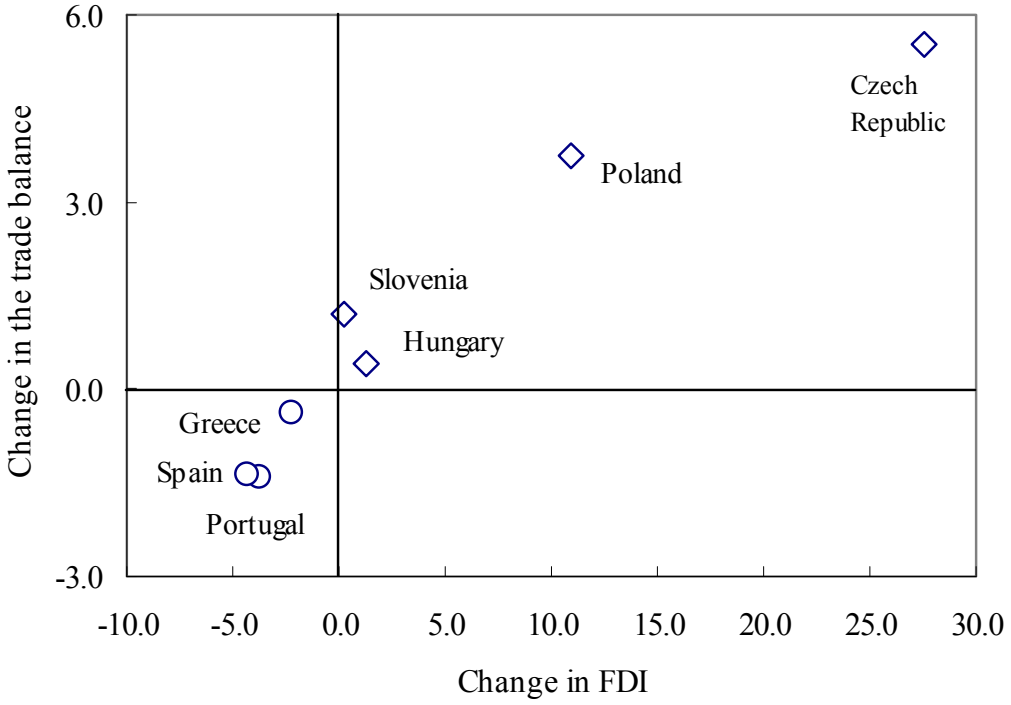


Source: World Economic Outlook; International Financial Statistics; NIGEM; authors' calculations.

1/ Observations above 100 are defined as an increase in competitiveness, that is, real depreciation vis-à-vis the base period. Data for 2005 are up to August.

Figure 2. Foreign Direct Investment is Paying Off 1/

(Change in FDI and the goods trade balance, in percent of GDP)



Source: *World Economic Outlook*, authors' calculations.

1/ On the horizontal axis is a difference between the stock of FDI-to-GDP ratio in 2003-2004 and 1998-1999. On the vertical axis is a difference between the average trade balance in goods in 2003-2004 and 1996-1999.

Figure 3. The Impact of an FDI shock

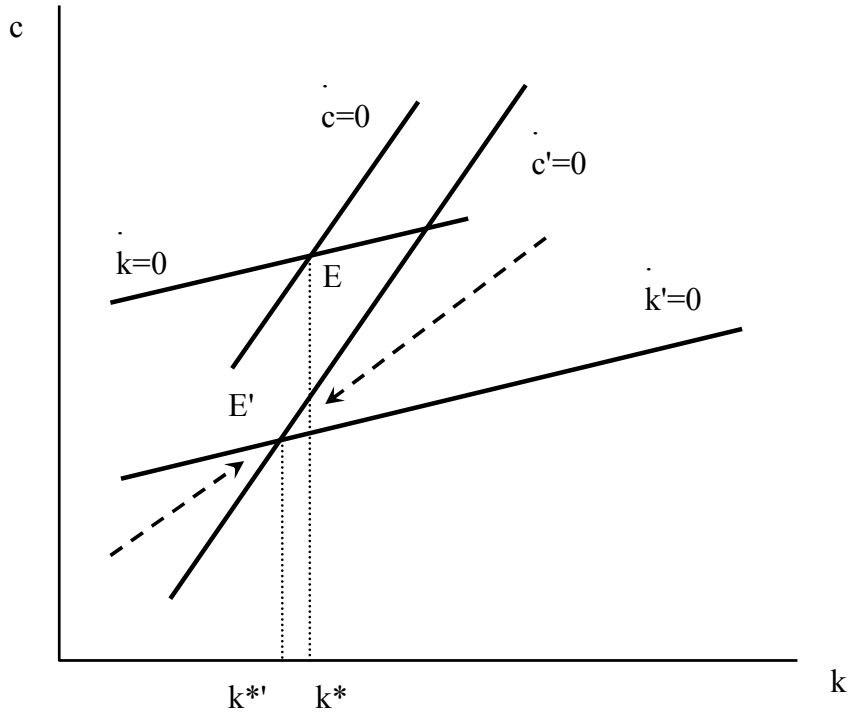
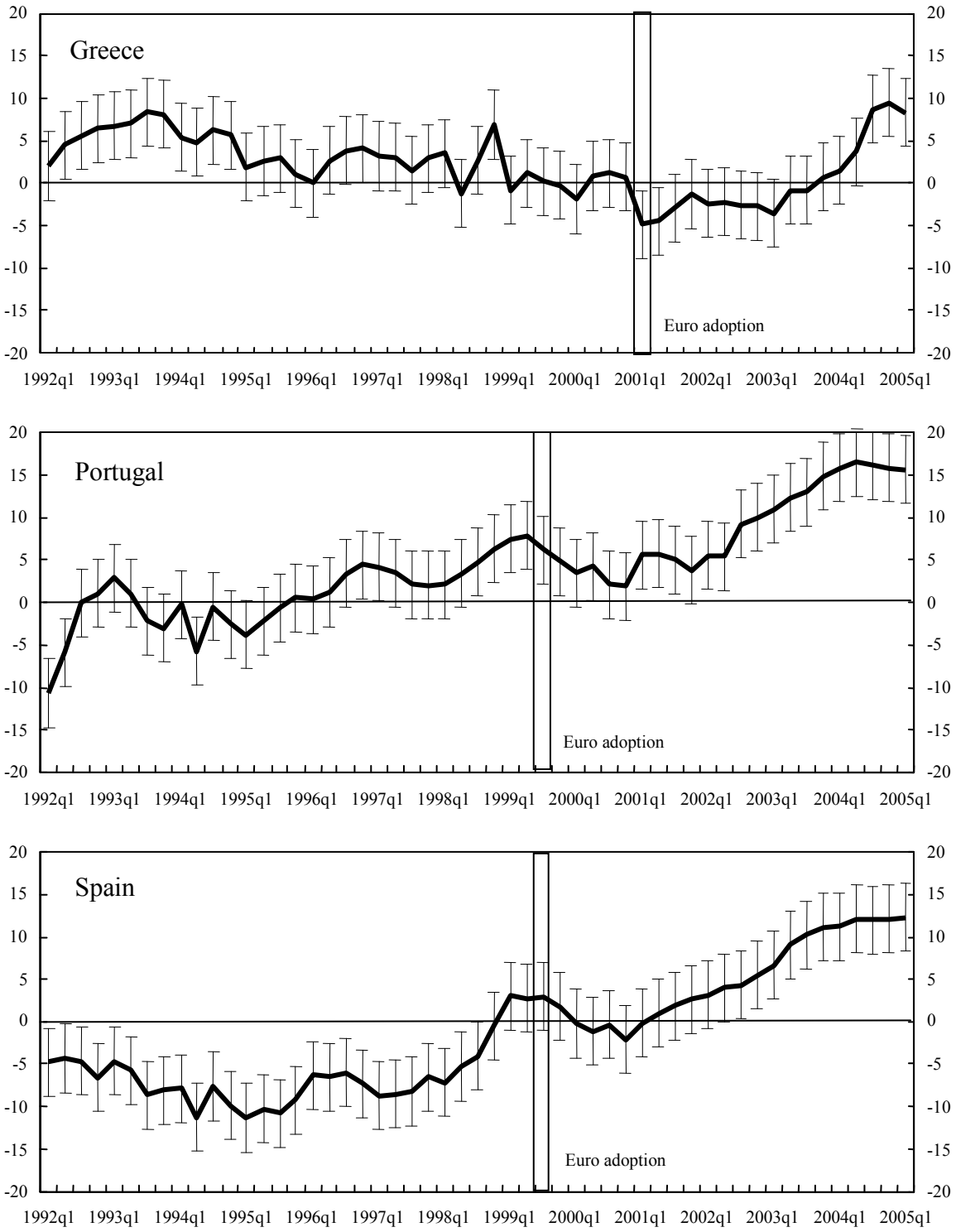


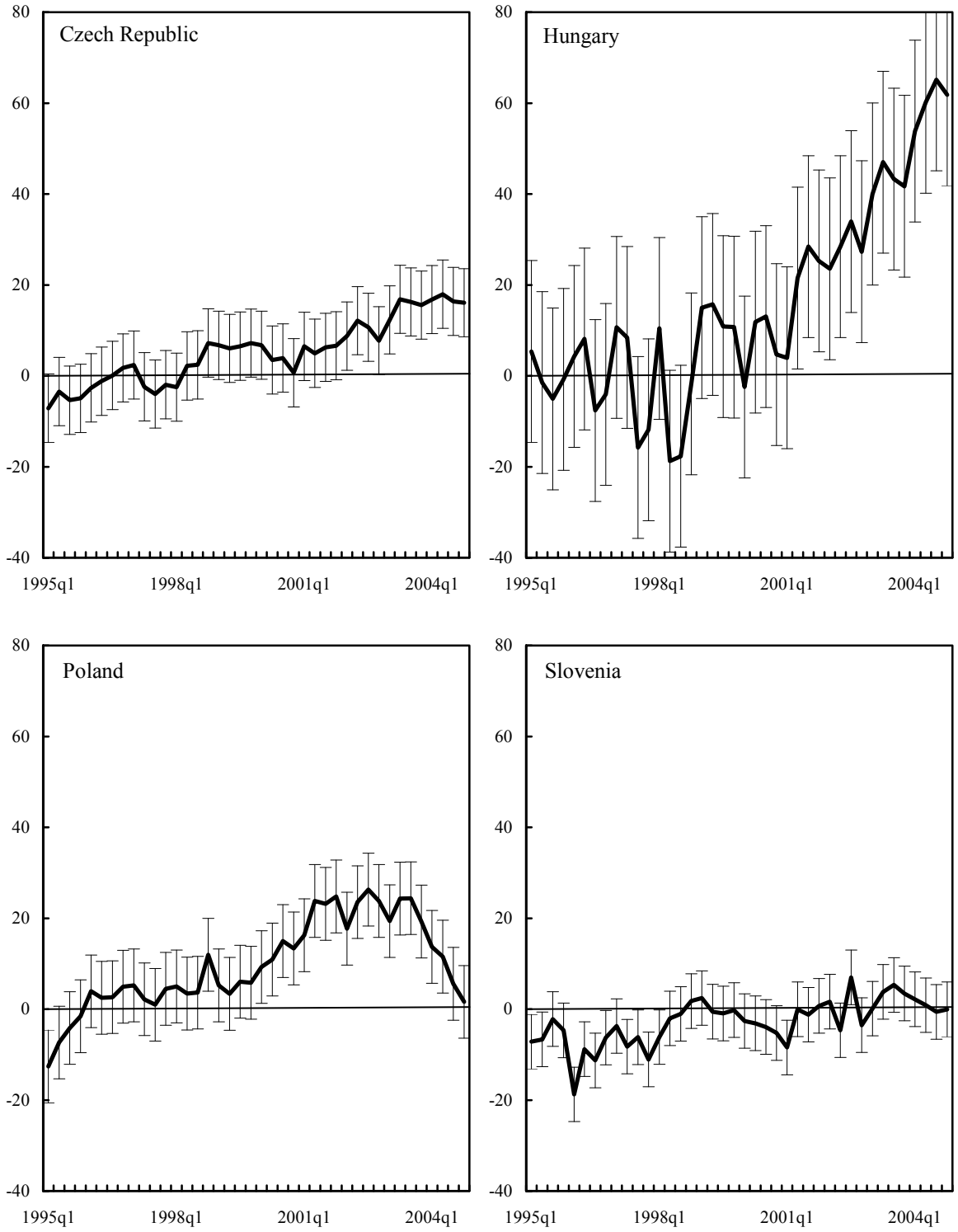
Figure 4. Latecomers' Misalignment: Is the "Smooth Sailing" Over? 1/
(Deviation from the estimated SRER, in percent)



Source: Authors' calculations.

1/ Positive values imply overvaluation and vice versa.

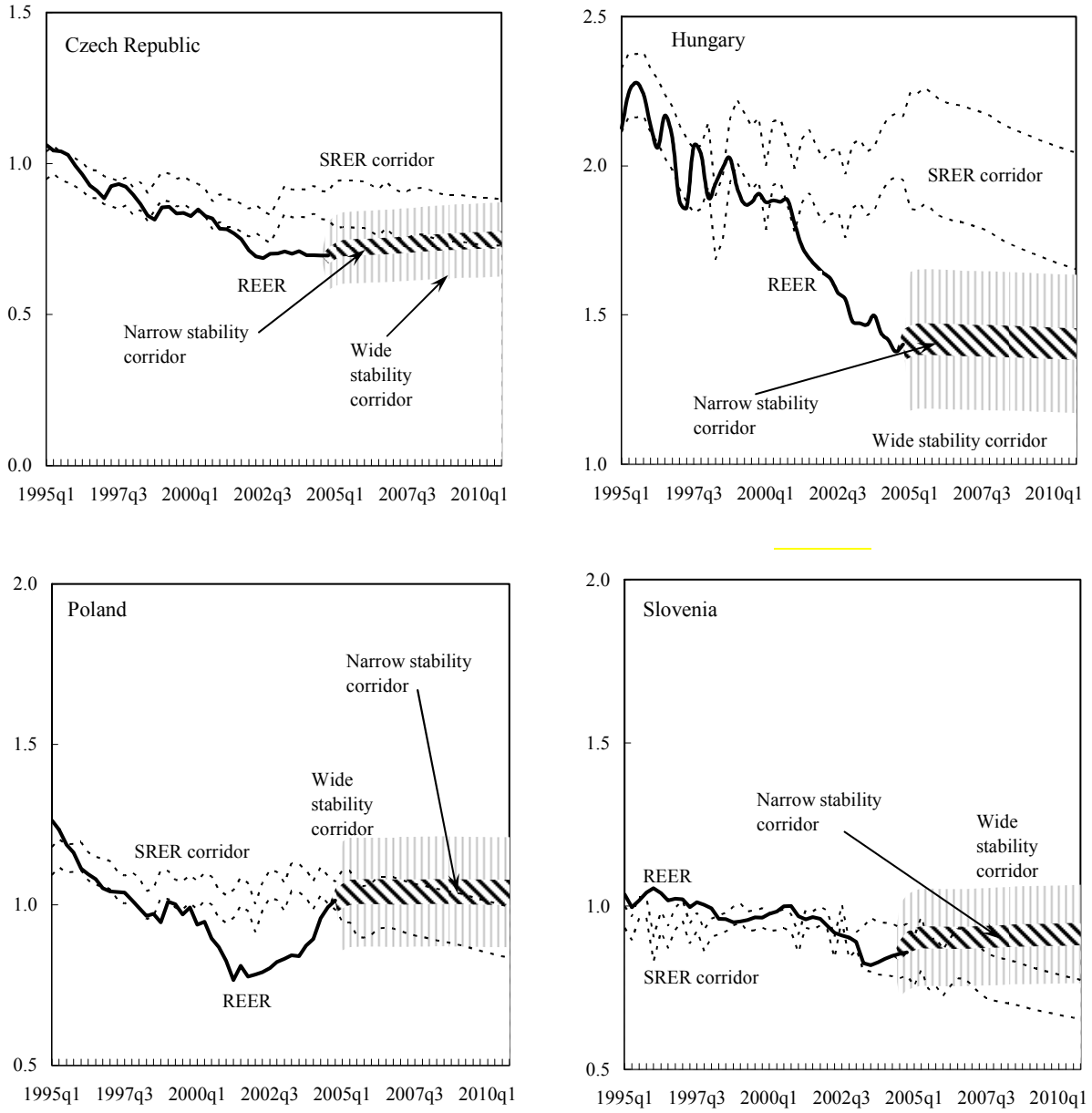
Figure 5. Latecomers: Misalignment of Real Exchange Rates, 1995-2004 1/
(Deviation from the estimated SRER, in percent)



Source: Authors' calculations.

1/ Positive values imply overvaluation and vice versa.

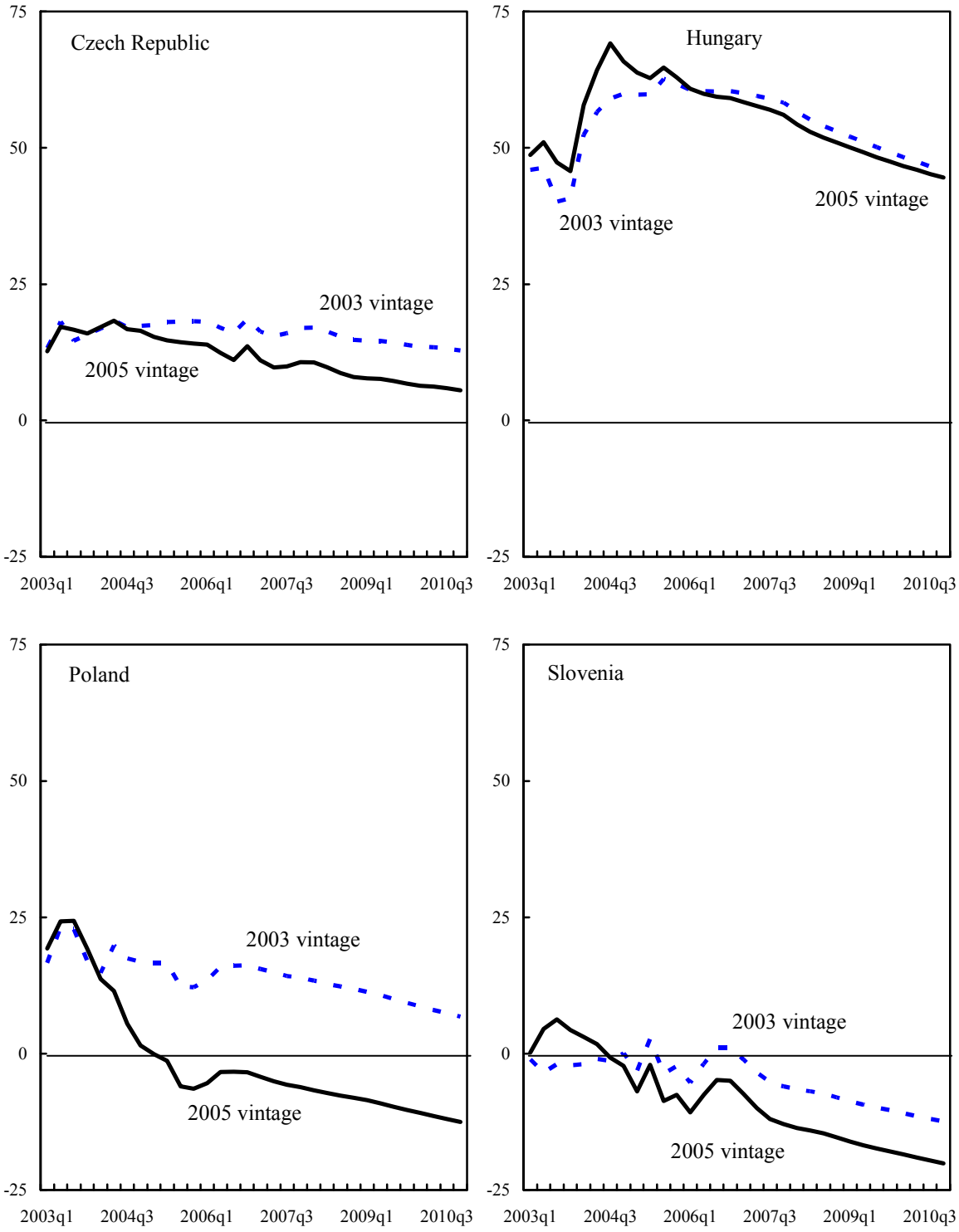
Figure 6. Latecomers: How Sustainable Are Current Real Exchange Rates? 1/



Source: Authors' calculations.

1/ Lower values imply real appreciation. The narrow and wide bands are defined as 3.75 percent and 16.5 percent around the central estimate respectively, to reflect both the inflation (1.5 percent) and exchange rate (2.25 percent) convergence criteria. The band is narrowed to 1.5 percent thereafter, as the national exchange rates are fixed and only the inflation criterion matters.

Figure 7. Latecomers: Converging Faster or a Cyclical Improvement? 1/
(SRER minus the mid-point of the stability corridor)



Source: Authors' calculations

1/ 2003 and 2005 vintages are based on mid-2003 and end-2004 macroeconomic projections, respectively. The former results were presented in Bulíř and Šmídková (2005).

Table 1. Calibrated Elasticity of Export (α) and Import Functions (β) 1/

Parameter and its notation		Value
Export Function (7)		
Real exchange rate elasticity of exports	α_1	3.15
Foreign demand elasticity of exports	α_2	1.00*
FDI (stock) elasticity of exports	α_3	0.70
Import Function (8)		
Real exchange rate elasticity of imports	β_1	-0.62
Domestic demand elasticity of imports	β_2	1.00*
FDI (stock) elasticity of imports	β_3	0.24

Source: Šmídková *et al.* (2002).

1/ Parameter values denoted with an asterisk were imposed during the estimations to ensure that the country's share of world exports and imports is independent of both the level of world trade and domestic demand.

Table 2. Net External Debt Targets

Country	Exports-to-GDP Ratio (in percent)	External Debt Target
The Czech Republic, Hungary, Slovenia	Higher than 40	65
Poland, Greece, Portugal, Spain	Higher than 30, but lower than 40	53

Source: Authors' calculations based on International Monetary Fund (2002).

Table 3. Definition of Variables

Variable	Notation	Data Source
Effective foreign import demand (in millions of US dollars)	S	NIGEM, June 2005
Effective world real interest rate (in percent)	r	NIGEM, June 2005
Import prices (index)	P_m	NIGEM, June 2005
Export prices (index)	P_x	NIGEM, June 2005
US dollar exchange rate (in domestic currency terms)	E	NIGEM, June 2005
Real domestic output (in constant prices)	Y	NIGEM, June 2005
Real exports (base index)	X	NIGEM, June 2005
Real imports (base index)	M	NIGEM, June 2005
Domestic consumer price index (CPI)	P	NIGEM, June 2005
Export volume in the base year (1994) (in millions of US dollars)	$\overline{X}$	IMF, Balance of payments Statistics Yearbook, 2002
Import volume in the base year (1994) (in millions of US dollars)	$\overline{M}$	IMF, Balance of Payments Statistics Yearbook, 2002
Initial level of external debt (in millions of US dollars)	D_0	NIGEM, June 2005; IFS; and Rider (1994) 1/
Stock of FDI (in percent of GDP)	FDI	NIGEM, June 2005; IFS, June 2005; and Rider (1994) 1/
Net external debt target for time T (T = 2022; in percent of GDP)	D^*	Calculations based on International Monetary Fund (2002)

1/ Calculations based on NIGEM projections of FDI flows and initial estimates of the FDI stock consistent with the estimate of the initial stock of net foreign assets (NFA).