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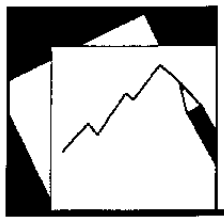

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Capital Flows to Transition Economies: Master or Servant?

Leslie Lipschitz, Timothy Lane and Alex Mourmouras

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Capital Flows to Transition Economies: Master or Servant? (Revised Version)

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Abstract

This paper discusses the forces driving capital flows in the transition countries of Central and Eastern Europe (CEE). It argues that various influences—specifically, the real exchange rate history and trend and the factor intensity of production—can combine to motivate very large capital inflows. These inflows can either undermine attempts at monetary restraint or force excessive appreciations. They can also render the economy highly vulnerable to shifts in market sentiment. The policy implications of the analysis are awkward: exposure to global capital markets sets up difficult dilemmas for policy and leads to vulnerabilities that can be reduced but not eliminated.

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Contents Page

I. Introduction 3

II. Stylized Facts 4
A. Trend Real Appreciation 4
B. Interest Arbitrage 6
C. The Implications of Capital Scarcity 8
D. What Limits Capital Flows to Transition Economies? 11

III. The Policy Dilemma 1213

IV. The Bottom Line and the Implications for Policy 14

Tables
1. Real GDP and Real Exchange Rates: 10 CEE Countries 4
2. Actual and Parity Real Interest Rates 7
3. CEE: Potential Capital Inflows: Illustrative Calculations, 1999 9
4. Potential Capital Inflows 10

Annex
Illustrating Balassa-Samuelson Effects and Investment Subject to Adjustment Costs 18
A. Balassa-Samuelson Effects 18
B. A Neoclassical Model of Investment Subject to Adjustment Costs 19

References 24

I. Introduction

This paper argues that the problem of large and potentially erratic capital flows is endemic to transition countries with open capital accounts. Rather than being seen as one-off destabilizing events, the potential for overwhelming capital flows should be seen as intrinsic to the transition process and it should be factored into decisions about monetary policy, the exchange rate regime, capital account liberalization, and macroeconomic policies more generally.[2]

The analysis is motivated by two stylized facts.

First, there has been and continues to be a pronounced real appreciation of the currencies of the more advanced transition countries of Central and Eastern Europe (the CEE countries) against the currencies of their western industrial neighbors.[3] To the extent that this is an equilibrating appreciation, it is not any cause for concern. The trend appreciation does, however, constrain interest rate policies and have implications for exchange rate management insofar as these countries are open to international capital flows.

Second, production in the transition countries is characterized by capital/labor ratios that are much lower than those of their more advanced western neighbors. This scarcity of physical capital, together with reasonably strong endowments of human capital and infrastructure, means that the marginal product of capital—and thus the notional closed-economy equilibrium real interest rate—is relatively high.

The clash between the low equilibrium real interest rate derived from interest parity conditions and the trend real appreciation (stylized fact 1) and the high equilibrium real interest rate derived from the capital scarcity in the real economy (stylized fact two) motivates the arguments that follow and sets up an interesting dilemma for economic policy.

The paper focuses on the dilemma capital flows create for macroeconomic policies, rather than on issues associated with the composition of the flows. For instance, foreign direct investment (FDI), a major component of capital inflows to CEE, has macroeconomic consequences similar to those of other forms of capital inflow, even though it plays a distinctive role at the microeconomic level (for instance by facilitating the transfer of technology and management techniques). Moreover, FDI is less likely than other inflows to be unwound quickly in response to changes in market sentiment and some of the impact of

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[2] Indeed, it may be argued more generally, that capital surges are likely to characterize any successful process of development.

[3] In this paper, CEE is taken to comprise Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia.

such a change on the country's external position is absorbed by changes in market valuation.[4] For the most part, the discussion in the paper abstracts from these differences.

The remainder of the paper is structured as follows. Section II discusses the two stylized facts and their implications. Section III presents the resulting policy dilemma and possible ways of resolving it. Section IV presents concluding remarks.

II. Stylized Facts

A. Trend Real Appreciation

Table 1 illustrates the first stylized fact. It shows cumulated real GDP growth for the ten countries over the first five years of the transition and over the second five-year period. GDP growth measured in conventional real terms is relatively modest, but GDP measured in terms of deutsche mark (DM GDP—most of the period under investigation is pre-euro) is very high. Most of the difference is due to a very large real appreciation vis-à-vis the deutsche mark (RER). Even though the appreciation is slower in the second five-year period, it is still considerable.

Table 1. Real GDP and Real Exchange Rates: 10 CEE Countries 1/

(Cumulative Percentage Change)

	1992-1997 2/			1997-2002 2/		
	Real GDP	DM GDP	RER	Real GDP	DM GDP	RER
Total	7.0	177.7	147.3	18.6	66.9	34.5

Source : IMF, *World Economic Outlook.*

1/ Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia.

2/ RER are vis-à-vis DM; Figures for 2001-02 are WEO projections.

[4] There is nonetheless a range of views in the literature over the relative volatility of FDI and other forms of capital. The experience of recent crises suggests that FDI can be quite volatile as illustrated by the marked decline in FDI in Russia in the aftermath of its 1998 crisis; this view is supported by empirical work by Dooley, Fernandez-Arias, and Kletzer, 1994. But the prevailing view is that FDI is nonetheless less volatile than other forms of capital; see, for instance, Sarno and Taylor, 1999.

Several alternative interpretations of these real appreciations are possible: [5]

a. The tradable-producing industries in the transition countries started the transition with depressed demand and new competition in their traditional markets, and little if any reputation or brand recognition in western markets. To the extent that current account flows influenced starting exchange rates, therefore, it is not surprising that these rates were very depreciated. As reputations were established and penetration of western markets progressed, some real appreciation was warranted solely on the basis of the changing conditions for trade. This process has been protracted and, indeed, is still far from complete.

b. A slightly more complex interpretation attributes the real appreciations to Balassa-Samuelson effects—i.e., rising *total factor productivity in tradable goods* relative to non-tradables. The gain in total factor productivity could reflect the establishment of the institutional foundations of a market economy in a more stable macroeconomic setting, along with the benefits of exposure to global markets. Rising output of traded goods and higher incomes are bound to put upward pressure on prices in the nontraded sectors—through demand pressures in both the labor and product markets.

The Balassa-Samuelson result can be illustrated using a model with two goods (tradables and nontradables) and two factors (labor and capital). Labor is immobile internationally but is fully mobile across sectors within a country. Capital is fully mobile internationally and the real interest rate (in terms of tradables) is determined exogenously in the world capital market. In this model, in which there is no capital scarcity by definition, domestic real interest rates in terms of tradables are always equal to world real interest rates. A country's relative price level will tend to rise if its TFP growth differential vis-à-vis the rest of the world is higher in the tradables sector than in the nontradables sector. The only requirement is that nontradables are not less labor-intensive than tradables. (See the Annex for more details.)

Suppose for instance, that growth in total factor productivity in the tradables sector of the transition country, denoted $\hat{A}_T^C$, exceeds that of the industrial country, $\hat{A}_T^G$, and that TFP is constant in non-tradables in both countries. Assume too that the price of traded goods is arbitraged internationally, and that there is wage leadership from the traded to the non-traded sector in the transition country. In these circumstances, the real appreciation of currency C in terms of relative CPIs would be equal to

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[5] See Halpern and Wyplosz (1996). In addition to the explanations discussed in this section, in some countries removal of consumer subsidies and price liberalization, as well as the introduction of VAT and excise taxes, also affected CPI real exchange rates without having any direct implications for competitiveness. These effects have been sizable for some countries, including the Baltics.

$$\pi^C - \pi^G - \Delta e/e = (1-\gamma)(\hat{A}_T^C - \hat{A}_T^G), \quad (1)$$

where γ is the weight of tradables in the CPI, assumed the same in the transition country and in Germany. This result is derived for the more general case in the Annex.

c. An alternative case would be one in which the real appreciation results entirely from *capital accumulation in the tradables sector*. This will raise the marginal product of labor in tradables, raise wage rates in the sector, and, through wage leadership, increase wages too in the production of non-tradables—with much the same effect as in the previous example. It is worth noting that there is no real appreciation in this case in terms of relative unit labor costs in tradables—as productivity changes offset wage increases—but there is a real appreciation in terms of broader price indices such as the CPI.[6]

d. A real appreciation may also be a temporary monetary phenomenon, reflecting an unsustainable loss of competitiveness—e.g., because of excessive monetization of government deficits within a pegged exchange rate regime.

In cases a, b, and c the real appreciation reflects an ongoing equilibrating process. Case d is less interesting for the purposes of the present analysis in that the historical appreciation is unlikely to continue—indeed, it is likely to be reversed sharply at some stage.

B. Interest Arbitrage

Capital inflows are linked with the real appreciations of exchange rates that many transition countries in the region have undergone (Figure 5). On the one hand, inflows may be motivated by the anticipation of real appreciations. On the other, inflows support the real appreciation: huge starting disparities in capital/labor ratios and real rates of return are bound to elicit capital flows, large but uneven productivity gains, substantial increases in income, and significant Balassa-Samuelson effects.

The first point can be made with reference to the basic uncovered interest parity relationship, linking nominal interest rates to the expected nominal depreciation of the transition country's currency:

$$i^C = i^G + \Delta e/e, \quad (2)$$

where superscripts refer to a transition country C and the industrial country G, i is the nominal interest rate, and e is the exchange rate expressed in units of currency C per unit of currency G. This implies the following relationship between real interest rates and the rate of real appreciation of the transition country currency:[7]

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[6] See Lipschitz and McDonald (1990).

[7] This derivation uses the usual approximation $(1 + a)/(1 + b) \approx (a - b)$ when a, b are small.

$$r^C = r^G - (\pi^C - \pi^G - \Delta e/e), \tag{3}$$

where the expression in parentheses on the right-hand side represents the rate of real appreciation of the currency of the transition country, expressed in terms of consumer price indices, and π^i is the rate of consumer price inflation in country *i*.

This relationship can be considered in light of the substantial real appreciations experienced by a number of transition economies. Table 2 presents illustrative calculations for the parity real interest rates for selected European transition economies implied by the right-hand side of (2), on the assumption of uncovered interest parity vis-à-vis Germany, and assuming that the average rates of real appreciation experienced since 1995 are expected to continue.[8]

Table 2. Actual and Parity Real Interest Rates
for Selected European Transition Countries, December 1999

Countries	Actual Real Interest Rate 1/	Real Currency Appreciation 2/	Parity Real Interest Rate 3/
Bulgaria	-10.4	8.5	-5.8
Czech Republic	-2.0	4.9	-2.6
Estonia	-6.2	10.1	-7.2
Hungary	3.1	2.4	-0.3
Latvia	3.4	11.4	-8.3
Lithuania	8.8	14.5	-10.8
Poland	4.4	5.8	-3.4
Romania	21.7	4.1	-1.9
Slovak Republic	7.4	4.4	-2.1
Slovenia	-5.1	2.3	-0.1

Sources: IMF, *International Financial Statistics* and staff calculations.
1/ Short-term treasury bill rates are used except for the Czech Republic, Estonia, and Slovak Republic for which we use deposit rates.
2/ Average annual rate, December 1994 to December 1999.
3/ The parity real interest rate is calculated using the average German real interest, December 1994 to December 1999.

These results indicate that, under the assumptions made, unfettered capital mobility would drive real interest rates well into negative territory. The substantial gaps between actual and parity interest rates need to be explained, as they would seem to imply a rather compelling incentive to import capital into these countries.

[8] The reader is cautioned regarding the limitations of comparability of data. For instance, in Latvia yields on treasury bills are lower than other interest rates, reflecting their value to banks as collateral. (This would of course amplify the difference between actual and implied real interest rates highlighted in the table.)

C. The Implications of Capital Scarcity

It is useful to turn now to an analysis of interest rates and capital flows from a different—domestic—perspective. To the extent that capital flows reflect imbalances in initial stocks of capital, the magnitude of potential capital flows to European transition economies can be estimated based on existing capital stocks.[9]

As a starting point, Table 3, column 1, highlights the large differences in output per worker between the European Union (EU) countries and the CEE countries. Insofar as the large differences in output per worker reflect differences in capital-labor ratios, the process of growth and development should entail huge capital inflows. The magnitude of these potential flows can be ascertained by the following calculations, which closely follow Lucas (1990). Suppose output in both the EU and CEE is produced by a single sector, with the *same* Cobb-Douglas production function in each country, $Y_i = AK_i^{\alpha} L_i^{1-\alpha}$. In intensive form, output per worker (y) is function of capital per worker (k), $y_i = Ak_i^{\alpha}$. The marginal product of capital is $r_i = A\alpha k_i^{-(1-\alpha)}$ or, in terms of output per worker,

$$r_i = \alpha A^{1/\alpha} y_i^{\frac{1-\alpha}{\alpha}}. \tag{4}$$

If Germany is taken to represent the EU, and i denotes a representative CEE country, then from equation (4),

$$\frac{r_i}{r_{ger}} = \left(\frac{y_i}{y_{ger}} \right)^{-\frac{1-\alpha}{\alpha}}. \tag{5}$$

Equation (5), together with an estimate of the capital intensity of production, can be used to estimate the returns to capital in the CEE (Table 3, Column 3). Assuming a benchmark value of $\alpha = 1/3$, the marginal product in the transition economies in 1999 was between 2 and 23 times the marginal product of capital in Germany.

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[9] For a detailed analysis of supply conditions at the start of the transition see McDonald and Thumann (1990).

Table 3. CEE: Potential Capital Inflows: Illustrative Calculations, 1999 1/

	y_i/y_{Ger} 2/	k_i/k_{Ger} 3/	MPK 4/	Potential Inflows 5/			
				η=1 6/	η=0.9 7/		
				Year following liberalization			
				1	1	2	3
Bulgaria	22.9	1.2	19.1	752.7	349.3	77.7	19.2
Czech Republic	53.6	15.4	3.5	275.1	109.0	29.9	2.8
Estonia	31.1	3.0	10.3	542.7	249.2	61.8	14.1
Hungary	55.7	17.2	3.2	258.9	100.5	27.5	1.9
Latvia	20.9	0.9	22.9	824.7	385.7	82.5	20.6
Lithuania	28.5	2.3	12.3	596.3	276.1	66.5	15.7
Poland	38.6	5.8	6.7	424.5	188.4	49.7	10.0
Romania	26.9	1.9	13.8	634.3	296.4	69.8	16.7
Slovak Republic	42.2	7.5	5.6	381.1	165.8	44.3	8.0
Slovenia	72.8	38.6	1.9	146.8	40.3	7.6	-6.5
Median	34.9	4.4	8.5	483.6	218.8	55.8	12.1
Minimum	20.9	0.9	1.9	146.8	40.3	7.6	-6.5
Maximum	72.8	38.6	22.9	824.7	385.7	82.5	20.6

Sources: WEO; World Bank, World Development Indicators (WDI); and staff calculations.

1/ Common Cobb-Douglas production function, $y=k^{\alpha}$; $\alpha=1/3$; $r=0.04$; $\delta=0.15$.

2/ GDP per worker in percent of German GDP per worker (PPP basis).

3/ capital per worker (in percent of German capital per worker)

4/ Marginal product of capital (multiple of German product).

5/ Inflows in the period following liberalization of capital movements (in percent of GDP).

6/ With no adjustment costs, all inflows take place in the year following liberalization.

7/ $\eta=0.9$ is the specification of adjustment costs used in Kehoe-de Cordoba (2000). See Annex.

If the simple model were true and world capital markets were free and complete, these enormous rate of return differentials would induce rapid flows of investment goods from Germany and other capital-abundant countries to the transition economies of the CEE. Indeed, as observed by Lucas, *no* investment would occur in the wealthy countries in the face of rate of return differentials of this magnitude between mature and transition or developing countries.

Assuming that the European transition economies are small relative to global capital markets, equality of rates of return for capital would imply that capital per worker and output per worker in the transition economies would be equalized to world levels in a single period. If $\bar{k}_i = k_{ger}$ denotes capital per worker following financial liberalization, the capital flow in relation to pre-flow GDP would be

$$\frac{\bar{k}_i - k_i}{y_i} = \frac{k_{ger} - k_i}{y_i} = \frac{k_{ger}}{y_{ger}} \frac{y_{ger}}{y_i} \left(1 - \left(\frac{y_i}{y_{ger}} \right)^{\frac{1}{\alpha}} \right). \qquad (6)$$

The potential capital flow in relation to GDP varies directly with German capital abundance (the German capital-labor ratio); the potential flow is also higher the greater is the difference in relative per-worker outputs y_{ger}/y_i. To estimate the size of these potential one-time flows predicted by this simple model, we used the Penn World Tables' estimate of 1.74 for the German capital-output ratio in the late 1980s-early 1990s (Table 4). An economy with per worker output equal to ½ of Germany's would experience a one-time income-equalizing flow of over 300 percent of GDP. Even if output per worker is 80 percent of Germany's, this flow would still be over 100 percent of GDP.

Table 4. Potential Capital Inflows

y_i/y_{ger} (In percent)	Capital Inflow (In percent of GDP)
10	1738
20	863
30	564
40	407
50	305
60	227
70	163
80	106
90	52
100	0

Source: Staff calculations.

Turning to the CEE countries, the magnitude of the one-time capital flows predicted by the simple model, in the absence of adjustment costs ($\eta = 1$ in Table 3), ranges from about 150 to 825 percent of GDP in 1989 (Table 3, Column 4). To put this in perspective, in a similar exercise for Spain's experience with capital flows following financial liberalization in 1986, Fernandez de Cordoba and Kehoe (2000) found that the capital flow required to equalize German and Spanish interest rates would be of the order of 86 percent of GDP.

A more realistic case is one in which it is assumed that *immobile or slowly adjusting factors of production* such as suitable land or particular types of human or physical capital may create bottlenecks that delay the adjustment of labor, capital and other factors. Limits to the intersectoral mobility of physical factors within the transition economies are a closely related friction which may be particularly relevant in the CEE countries. Substantial quantities of labor and capital need to be reallocated away from the sectors of the economy formerly under the control of the state and into the newly privatized economy, but this reallocation is bound to be costly given the sector-specific nature of some of the factors. The role of adjustment costs is illustrated in the Annex, which calibrates a simple neoclassical model of investment

subject to adjustment costs for the CEE economies. This model produces gradual convergence of the transition economies' capital-labor and per capita incomes to Western European levels. Illustrative results, for adjustment costs similar to those reported in the literature for other countries ($\eta = 0.9$) are shown in Table 3, Columns 5-7. These results indicate that physical adjustment costs can account for capital inflows that are much smaller than those that would be predicted in the absence of such costs—but even in the presence of such costs, capital flows are predicted to be much larger than those actually observed.

D. What Limits Capital Flows to Transition Economies?

While the European transition countries have received substantial amount of foreign financing in the decade following the transition, the current account deficits have not been anywhere close to those predicted by the simple model (Table 4). This raises the question of why capital flows have been so small, compared with the predictions of the model.[10] Several factors generating frictions in the pace of factor mobility may be mentioned briefly, although each of these could be analyzed in more detail.

First, some *technological factors* may result in differences in capital productivity in relation to the predictions of the above model, in which capital scarcity was the key factor. These factors include possible d*ifferences in technology*—reflecting not just the state of knowledge but also aspects of the way production is organized. They also include *externalities*, such as those associated with and human capital accumulation through "learning by doing", which may give rise to persistent cross-country differences in per capita incomes (Lucas 1988, 1990).

A second set of factors reflect the *policy environment*. These include *institutional factors* that determine the perceived risk of confiscatory taxation or exchange controls, as well as unclear property rights and uneven application of laws and contracts.[11] The governance of the

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[10] For a group of 23 industrialized countries during the 1960s and 1970s, Feldstein and Horioka (1980) found that domestic rates of investment and saving tended to be closely correlated. Feldstein and Horioka originally interpreted this puzzling finding as indicating the presence of substantial barriers to capital flows among industrialized countries. With the move to capital account liberalization in many industrial countries in the 1970s and 1980s, the correlations between S and I appear to have weakened when data for the 1980s are also considered. See Rivera-Batiz and Rivera-Batiz (1994), page 273.

[11] Such concerns are not confined to transition countries, of course, but are among the factors that limit the extent to which we operate in a truly global capital market. Tornell and Velasco (1992) attribute capital flows from poor to rich countries to weak property rights which induce a "tragedy of the commons". Groups representing special interests in poor countries are able to appropriate other groups' capital stocks, either directly or indirectly through their influence on the budgetary process. By contrast, investments citizens of poor countries make in rich countries are safe from expropriation risk. Recent findings by Garibaldi et al. (1999)

financial system affects its ability to channel capital flows efficiently. As a related point, there may be *credit market constraints* as access to credit may be limited by the availability of suitable domestic assets to serve as collateral.[12] Another important aspect is the degree of *macroeconomic stability* which affects the ability to plan investment; uncertain or turbulent macroeconomic prospects tend to limit capital inflows and in some cases lead to capital flight.[13]

Finally, capital flows much larger than those actually witnessed would result in *increasing concerns about repayment.* Such concerns are reflected in the fact that current account deficits are regarded as warning indicators of a crisis.[14] Underlying market concerns over current account deficits—even if they, in fact, reflect real factors such as capital scarcity and productivity growth—are the institutional and financial considerations mentioned in the previous two points, together with the difficulty market participants face in ascertaining that capital inflows are in fact based on these real factors. For these reasons, larger current account deficits would tend to be associated with higher required *risk premia* and would serve to limit the capital flows in response to any given differential in returns.

III. The Policy Dilemma

The two strands of the argument thus far set up an impossible dilemma for policy. The interest arbitrage conditions (of Equation 3 and Table 2) would seem to suggest that if the monetary authority in the transition country sets interest rates, ex ante, high enough to reflect the real capital scarcity in the country (as reflected in Table 3), there will be huge capital inflows (to take advantage of the real interest rate differential). Such large capital account inflows would elicit an equally large current account deficit.

If the domestic monetary authority sets interest rates low enough to forestall such arbitraging inflows, they will be so far below the marginal product of capital that there will be an enormous imbalance between saving and investment and a huge current account deficit.

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that the distribution of FDI flows across countries is significantly influenced by investor perceptions of country risk as well as survey-based indicators of the legal and political climate are consistent with the view that such factors are important limitations to capital flows.

[12] See Barro, Mankiw, and Sala-i-Martin, 1992; and Barro and Sala-i-Martin, 1995, p. 101.

[13] See for instance Abalkin and Whalley, 1999.

[14] Warning indicators have been discussed, for instance, by Berg and Patillo (1999). See also Keller et al. (2000), and McGettigan (2000).

In either case any semblance of financial restraint will be overwhelmed, and there will be a correspondingly large current account deficit.

The problem is quite independent of the exchange rate regime. Under a fixed rate regime the actual capital flows will occur. While the monetary authorities may try to sterilize the monetary impact, such sterilization will be very costly and ultimately unsuccessful. Thus the economy will become highly liquid, interest rates will be forced down to well below the real return on capital, and a huge imbalance between domestic saving and investment will produce a large current account deficit. Under a floating exchange rate the incipient capital flows will force an appreciation of the exchange rate with similar results for the current account (indeed, there will almost certainly be an overshooting of the exchange rate, as the exchange rate will have to move to a point where a significant depreciation is expected).

In the real world the dilemma is likely to be not quite as dire as that depicted above. While capital inflows may have been large at times, it is clear from Table 2 that they have been insufficient to arbitrage out real interest rate differentials. One can think of various reasons for friction in the system, but the most useful for our purposes is the existence of risk premia.

A Market Solution

Risk premia may be the market solution to the dilemma (as mentioned above). Consider the simplest ideal: market-determined risk premia set as a smooth, monotonically-increasing function of the current account deficit. In this case every country, no matter how small relative to global capital markets, would face an upward-sloping supply of funds. Thus, for example, with a balanced current account there would be very large incipient capital inflows and little independence for domestic monetary policy. As the current account deficit increased, risk premia would rise, permitting some increase in domestic interest rates above those abroad. Eventually, at some equilibrium level of the current account deficit—ideally a level where investment would be high, but not so high as to lead to significant adjustment friction and high inflation—risk premia would be sufficiently large to permit the authorities to set domestic interest rates at a level that could equilibrate saving and investment. If risk premia were determined in this way, the transition countries would be able to pursue real convergence—i.e., convergence of capital/labor ratios and productivity levels—with optimal assistance from global capital markets.

The real world is seldom this benign: in practice, risk premia are unlikely to be so well behaved. They will be a function of a broad array of variables, some obvious—domestic economic, financial, and political developments—some beyond domestic influences—such as global capital market conditions—and some seemingly erratic—bandwagon effects, contagion, and the like. We have observed circumstances where capital pours into a country despite a current account deficit that rises from 3 percent of GDP to 5 percent and to 8 percent, and indeed deficits of this magnitude may well be quite appropriate. But suddenly, because of changed perceptions about the sustainability of the situation, altered conditions elsewhere in the capital market, or, perhaps, simply bandwagon effects, there is a shift of sentiment and a sharp reversal of capital flows leading to a balance of payments or a currency

crisis. It takes time (and a painful compression of demand) for the current account to adjust, and the different pace of adjustment between the current account and the capital account usually entails a very costly overshooting. For this reason, even where capital inflows reflect the real forces discussed, they may be of considerable concern due to the resulting buildup of vulnerabilities and the challenge they present for economic policy.[15]

IV. The Bottom Line and the Implications for Policy

The conclusions of the analysis thus far are threefold:

- There are real and fundamental mechanisms, endemic to the process of convergence in transition countries, that will make these countries highly sensitive to external capital market conditions and will limit domestic monetary independence.

- As these are real not nominal mechanisms, the choice of exchange rate regime will not solve the problem (though, as argued below, it may have some significant secondary implications).

- To the extent that risk premia behave sensibly and are linked to domestic developments, they can provide some protection; but, when risk premia are erratic (at least from a domestic perspective), the country will be subject to erratic, and potentially overwhelming, influences from abroad.

The policy implications of these points are both awkward and profound.

Like honest citizens in a dangerous neighborhood, transition economies that open themselves up to free capital flows are vulnerable.[16] Global capital markets are huge relative to the size of these economies, so small portfolio shifts can exert an overwhelming influence on capital flows and domestic financial conditions. Policies should be set so as consciously to reduce vulnerabilities. There are five basic implications for policy.

First, sound economic management may be characterized as ensuring that the impetus for changes in capital market sentiment do not emanate from erratic domestic policies. This goes

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[15] A useful reference is Schadler et al., 1993, which considered the experience of 6 countries faced with surges of capital inflows: within the five years following the publication of this study, three of these countries had undergone major crises. The countries experiencing crises were Spain (1993), Mexico (1994-95), and Thailand (1997-98); Chile and Colombia weathered international financial crises; while in Egypt, the episode of capital inflows proved short-lived.

[16] While the current paper focuses on transition countries, much of the argument applies to emerging market economies more generally.

beyond simply having sensibly conservative policies and requires that the market be properly informed about them. When information on a country is restricted, the large throng of relatively uninformed investors follows the few who are deemed to have special access to information. This makes for bandwagon effects, runs, and panics. But, given equal access to data, economists and financial analysts rarely agree on anything. Thus easy access to information allows investors to assess risks independently and is likely to militate against herd behavior. Therefore, policy transparency and data dissemination should be seen as essential elements of economic management.

Second, openness to global capital markets reduces the possible range of action for monetary policy. The fiscal stance becomes, therefore, *the* preeminent tool of stabilization policy.[17] But there are practical limitations to the ability of fiscal policy either to offset the expansionary impact of a large capital inflow or to provide support for economic activity in the event that these flows are reversed. In practice it makes sense to pursue contractionary fiscal policies during periods of large inflows. Moreover, a strong fiscal position is both a confidence-inducing aspect of policy—that will militate against a capital account reversal—and a useful shock absorber—making it possible to adopt an expansionary stance in response to a sharp turnaround in the capital account. But there are practical limits to what should be expected of fiscal policy: it is highly unlikely that any government will be able to change the stance of fiscal policy in the magnitudes and with the rapidity required to offset shifts in the capital account. Fiscal policy—which is constrained by multi-year governmental obligations and programs and is subject to parliamentary debate and approval—is simply not a sufficiently flexible instrument.[18]

Third, with respect to the appropriate pace and sequencing of capital account liberalization, the conventional desiderata apply: the long side of the market should be opened up before the short—i.e., foreign direct investment before portfolio flows—and the financial system needs to be able to withstand the associated stresses—requiring some minimum standard of financial supervision and regulation. Beyond this, insofar as erratic changes in risk premia can reasonably be construed as a market failure, there may be a "market-failure" case for imposing capital controls which may override the presumption of substantial gains from intertemporal trade. Price-based controls on short-term inflows are a comparatively market-friendly option—and, although they may have little immediate impact on the overall volume

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[17] This can be illustrated in the simplest Mundell-Fleming model: with fixed exchange rates and capital mobility, monetary policy is irrelevant and only fiscal policy affects economic activity and the current account; with floating exchange rates, a combination of fiscal tightening and monetary easing can be used to reduce the current account deficit.

[18] As an illustration, consider the 1997-98 Asian crisis: given sound initial fiscal positions there was substantial room for fiscal deficits to expand once it became evident that the crisis was leading to a precipitous drop in private domestic demand; but this expansion was not sufficient to prevent severe recessions (Lane et al. (1999)).

of flows, may alter its composition in a way that limits vulnerability (Montiel and Reinhart, 1999; Johnston et al., 1999). It would be folly to push this line too far in practice: it is often difficult to make controls stick (especially for a country with a very open current account), controls that can be circumvented may produce a culture of evasion, and over the longer term capital controls may well reduce beneficial inflows or distort their allocation within the economy. But it is, in part, for such reasons that some countries in Central and Eastern Europe—including Hungary, Poland, Slovenia, and Croatia—have retained some controls on short-term capital.[19]

Fourth, the institutional and regulatory regime in the financial sector is important. A strong prudential regime should be in place before the capital account is fully liberalized. Banks' open foreign exchange positions should be strictly limited. There may, moreover, be hidden risks even if banks seemingly have no net foreign exchange exposure. Where banks borrow abroad in a foreign currency and then onlend to domestic corporations in the same foreign currency, there is a danger that a large exchange rate change will impose large losses on exposed corporate borrowers; this could render banks' foreign-currency-denominated domestic assets nonperforming, and leave banks with net exposure to foreign creditors. There are reasons, therefore, to be concerned too about excessive corporate foreign exchange exposure, and to seek policies that force corporations—especially those without the natural hedge of foreign exchange earnings—to be fully sensitive to currency risk.

Fifth, exchange rate policy is very important, though not in the conventional sense. The dilemma described is a real (as opposed to a nominal or monetary) phenomenon, it applies equally to a fixed or a floating exchange rate regime. However, the exchange rate regime can have a profound influence on market perceptions and behavior. From the point of view of domestic borrowers, as is clear from recent capital account crises, a long-lived peg can induce the private sector to take substantial open positions. It is clear, moreover, that sufficient exchange rate variance will be a disincentive to foreign exchange exposure. From the point of view of the authorities, large open positions in banks and corporations make it very costly to adjust exchange rates in a crisis; typically, therefore, governments try to resist for a while.[20] From the point of view of market agents, the exchange regime may create expectations of exchange rate movements: when it becomes evident that the authorities are resisting an inevitable break in a fixed exchange rate regime, the evident futility of the

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[19] In the case of Hungary, these controls were lifted in mid-June 2001 in conjunction with the adoption of inflation targets for monetary policy.

[20]The risk that, if a fixed exchange rate is sustained for some time, more and more private foreign exchange positions will go unhedged, resulting in increasing vulnerability to—and the potential cost of—a change in market sentiment, is illustrated by the experience of the Asian crisis countries in the run up to the 1997-98 crisis (Boorman and others, 2001). In contrast, one may consider the relatively benign reaction of Australia and New Zealand, with floating exchange rates, to the same crisis.

resistance may elicit massive opportunistic capital flows that overwhelm the government and produce an exchange crisis.[21] Therefore, in most circumstances, a floating exchange rate regime is less vulnerable than a pegged regime.[22]

[21]Under other circumstances, an exchange rate peg can have expectations effects that are favorable, for instance in the context of exchange rate based stabilizations and with hard pegs such as currency boards or dollarization; there is considerable evidence that, under propitious conditions, the credibility benefits of such regimes can translate into lower inflation without sacrificing growth performance (see Ghosh et al. (1998); Hamann (1999); Masson (1999); and Corker et al. (2000)). But such regimes are less likely to be promising in the context of substantial equilibrium real exchange rate movements.

[22]Of course, history is important. In the presence of large exchange rate exposures by the government, the banks, or the corporations—due, perhaps, to a prolonged period of more or less fixed rates—a shift from a fixed to a floating exchange rate may give rise to serious balance-sheet effects that would result in substantial overshooting. For this reason, in a highly dollarized economy, the authorities may well be unwilling to accept the large movements in exchange rates that would be likely to result (see Calvo and Reinhart, 2000).

ILLUSTRATING BALASSA-SAMUELSON EFFECTS AND INVESTMENT SUBJECT TO ADJUSTMENT COSTS

A. Balassa-Samuelson Effects

The Annex provides more details on the derivation of equation (3) on page 4, based on Obstfeld and Rogoff (1996). This analysis takes tradables as numeraire and normalizes the price of nontradables to 1 in both countries. (This is a real model which ignores the split between nominal currency appreciation and inflation.)

The transition country's price index, P, is given by $P = 1^{\gamma} p^{1-\gamma}$, where the price of tradables is normalized to unity and p is the relative price of nontradables in terms of tradables in the transition country and γ is the weight of tradables in consumer price index in the transition country. Likewise, the price level, P^*, in the industrial country (Germany), is given by $P^* = 1^{\gamma} \left(p^*\right)^{1-\gamma}$, where it is assumed that the share of tradables is the same in both countries. Dividing P by P^*, taking logarithmic derivatives with respect to time and indicating instantaneous percentage changes by a ^ yields

$$\frac{d \log P}{dt} - \frac{d \log P^*}{dt} \equiv \hat{P} - \hat{P}^* = (1-\gamma)(\hat{p} - \hat{p}^*) . \qquad (7)$$

Equation (7) is the key expression linking cross-country differences in inflation to real appreciation differentials. If we assume for the sake of simplicity that the industrial country had a constant price of nontradables, then its price level would be constant. The inflation differential between the transition country and Germany would then be equal to $(1-\gamma)\hat{p}$, the product of the share of nontradables in the transition country's price index times the percentage increase in its nontradables price. If the price of nontradables rose by 15 percent during a given year and their share in the price index were 50 percent, then the transition country's real appreciation rate would be 7 ½ percent, and so on.

According to Balassa-Samuelson, appreciation in the relative price of nontradables is driven by technological change in the tradables sector. Let $Y_i = A_i F_i(K_i, L_i)$ be the CRS production function in the tradables and nontradables sectors, i=T,N, and $\mu_{LT} \equiv \frac{wL_T}{Y_T}$ denote labor's income share in the tradables sector (μ_{LN} is defined similarly). Also let $\hat{A}_T \equiv \frac{\dot{A}_T}{A_T} > 0$ denote the rate of growth of TFP in tradables (a dot over a variable indicates differentiation with respect to time). It can be shown (see Rogoff and Obstfeld, page 212) that the rate of real appreciation in the transition country is given by

$$\hat{P} - \hat{P}^* = (1-\gamma)\left[\frac{\mu_{LN}}{\mu_{LT}}(\hat{A}_T - \hat{A}_T^*) - (\hat{A}_N - \hat{A}_N^*)\right]. \quad (8)$$

Higher productivity growth in tradables in the transition country pushes up the relative price of nontraded goods over time provided that $\mu_{LN} \geq \mu_{LT}$, that is provided that labor is used relatively intensively in the nontraded goods sector. If the production function for nontraded goods is Cobb-Douglas, $Y_N = A_N K_N^{\alpha} L_N^{1-\alpha}$, the factor shares are constant: $\mu_{LN} = 1-\alpha_N$, and $\mu_{KN} = \alpha_N$. In the Cobb-Douglas case, the condition $\mu_{LN} \geq \mu_{LT}$ boils down to the requirement that $\alpha_N < \alpha_T$ which is likely to be satisfied given that in practice traded goods have a larger content of imported capital inputs.

Equation (8) is the key link between TFP growth in tradables and real appreciation. Assume in addition that (1) tradables and nontradables have the same labor intensity ($\mu_{LT} = \mu_{LN}$); and (2) Equal rates of technical progress in the nontradables sector in the transition country and Germany). Then the inflation differential between the transition country and the west will be equal to the share of nontradables in the CPI times the differential in the growth rate of TFP in the tradables sector between the transition country:

$$\hat{P} - \hat{P}^* = (1-\gamma)(\hat{A}_T - \hat{A}_T^*). \quad (9)$$

This is equation (1) in the main text. Presumably the TFP growth differential between the transition countries and Germany was very high in the aftermath of these economies' opening up in the late 1980s and early 1990s as these countries adopted readily available western technology and management. The TFP differential would presumably taper off gradually as these "technological arbitrage" opportunities available to the transition countries are exhausted. Further growth in TFP in the transition countries would then come from local or western research and development efforts.

B. A Neoclassical Model of Investment Subject to Adjustment Costs

Adjustment costs in the installation of new capital are an important friction that can partly account for the difference between the large flows predicted by the benchmark model and those observed in reality. This section uses a simple model of investment in the presence of adjustment costs in the spirit of Lucas (1967) to provide a quantitative illustration of how capital inflows in the transition economies might slow down relative to the benchmark frictionless model.

Consumers

Consider a small open economy inhabited by a large number of identical, infinitely lived households, each maximizing $U = \sum_{t=0}^{\infty} \beta^t u(c_t)$, where $0<\beta<1$ is the subjective time discount

factor and the period utility function belongs to the CRRA family $u(c) = (c^{\rho} - 1)/\rho$. The intertemporal elasticity of substitution is $\sigma=1/(1-\rho)$. The representative household owns a unit of labor each period which he supplies inelastically to domestic firms. The representative household's assets at the beginning of period $t=0$ are denoted a_0. They consist of the initial domestic stock of physical capital, $k_0>0$, and initial foreign assets l_0 (which may be positive, zero, or negative). The market price of a unit of installed capital at date t is denoted q_t. We consider two regimes of intertemporal trade. Under *portfolio autarky*, domestic residents do not have access to the international capital market. In this case, domestic households' assets consist exclusively of claims on domestic firms, k_{t+1}. Under *perfect financial capital mobility*, on the other hand, the economy is open to asset trades with foreign residents. Domestic households' portfolios then consist of claims on domestic capital, k_{t+1}, and bonds purchased (or issued) in the international capital market, l_{t+1}, where

$$a_{t+1} = q_t k_{t+1} + l_{t+1}. \tag{10}$$

These internationally traded bond are one-period, risk-free securities issued at t and maturing at $t+1$. They are denominated in terms of the aggregative consumption good and bear the world rate of interest (r_t^*), which residents of our small open economy treat parametrically. In the absence of uncertainty and country risk premia, claims to domestic capital and international bonds are perfect substitutes in domestic residents' portfolios. The budget constraint of the household is

$$c_t + a_{t+1} \leq w_t + (1 + r_t^*)a_t, \tag{11}$$

$t=0,1,\ldots$ .The first order conditions for the problem yield the standard Euler equation

$$1 + r_{t+1}^* = \frac{u'(c_t)}{\beta u'(c_{t+1})} \tag{12}$$

At a consumer optimum, the marginal rate of substitution between present and future consumption must equal the real interest the consumer faces in the world capital market. The shape of the time path of consumption depends on the relative sizes of the subjective rate of time preference and the real interest rate. If $\beta(1 + r_{t+1}^*) = 1$, consumption is constant over time; if $\beta(1 + r_{t+1}^*) > 1$ then consumption is rising; otherwise it is falling. In addition, the equilibrium consumption path must satisfy a transversality condition ensuring that its present value equals the present value form of the household's wealth (no Ponzi games are possible).

Firms

There is any number of perfectly competitive domestic firms, each operating a Cobb-Douglas constant returns to scale technology. The representative firm produces output using hired labor and the capital stock it owns. Capital depreciates at rate δ per period. Following Lucas,

the installation of new capital goods is subject to adjustment costs. Denoting *net* real domestic investment by z_t, the representative firm's capital stock evolves according to

$$k_{t+1} \leq \varphi(z_t / k_t)k_t + (1-\delta)k_t, \tag{13}$$

where the adjustment cost function φ satisfies $\varphi' > 0$, $\varphi'' \leq 0$, $\varphi(\delta) = \delta$ *and* $\varphi'(\delta) = 1$. The advantage of this specification relative to, say, a quadratic form is that adjustment costs are independent of the scale of the firm. For the sake of simplicity, we adopt the parameterization used by Fernandez de Cordoba and Kehoe (2000):

$$\varphi(z/k) = \frac{1}{\eta}\left(\delta^{1-\eta}(z/k)^{\eta} - (1-\eta)\delta\right), \tag{14}$$

for $0<\eta\leq 1$. If $\eta=1$, there are no adjustment costs: $\varphi(z/k) = z/k$ and $k_{t+1}=z_t+(1-\delta)k_t$. Assuming the world rate of interest is constant and equal to r^*, the representative firm's problem at date $t=0$ is to select a sequence of labor hires, investment plans and capital per worker that maximize its discounted stream of profits

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r^*}\right)^t\left[Ak_t^{\alpha}N_t^{1-\alpha} - w_tN_t - z_t\right] \tag{15}$$

subject to (13). Since labor utilization can be adjusted costlessly, firms' labor demand schedules are derived from the first order conditions $w_t = (1-\alpha)Ak_t^{\alpha}$. However, firms' investment plans no longer correspond to the desired capital stock level satisfying $r_{t+1}^* + \delta = \alpha Ak_{t+1}^{\alpha-1}$. The adjustment cost slows down the pace of firms' capital accumulation, as demonstrated by the first order condition for investment. Letting q_t denote the multiplier corresponding to (13), the Lagrangian is

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r^*}\right)^t\left[Ak_t^{\alpha}N_t^{1-\alpha} - w_tN_t - z_t + q_t\left(\varphi(z_t/k_t)k_t + (1-\delta)k_t - k_{t+1}\right)\right] \tag{16}$$

The FONC with respect to z_t is

$$\varphi'(z_t/k_t) = \frac{1}{q_t}. \tag{17}$$

Investment is positive only if the shadow price of installed capital (q_t) exceeds unity, the market price of new capital goods. (For a related analysis of Tobin's q, see Rogoff and Obstfeld, 1996, page 107.) With k_t predetermined at t, $\phi'>0$ and $q_t>1$, equation (17) can be inverted to derive firms' investment demand schedules as an increasing function of q_t. For the specific functional form (14), the firm's investment demand schedule reduces to

$$z_t = \delta k_t q_t^{\frac{1}{1-\eta}}. \tag{18}$$

The FONC for k_{t-1} is

$$q_t = \frac{1}{1+r^*}\left[A\alpha k_{t+1}^{\alpha-1} + q_{t+1}\left(1-\delta+\varphi_{t+1}-\varphi'_{t+1}\frac{z_{t+1}}{k_{t+1}}\right)\right] \tag{19}$$

In light of equation (18), equation (19) simplifies to

$$q_t = \frac{1}{1+r^*}\left[A\alpha k_{t+1}^{\alpha-1} + (1-\delta)q_{t+1} + q_{t+1}\varphi_{t+1} - \frac{z_{t+1}}{k_{t+1}}\right]. \tag{20}$$

Along the optimum path of capital accumulation, the shadow price of an extra unit of capital, q_t, is the discounted sum of three components: (1) the marginal product of capital next period; (2) the shadow price of the undepreciated portion of the unit of capital next period; and (3) the capital unit's marginal contribution to lower adjustment costs next period.

Equilibrium

The feasibility constraint for the economy expressed in per worker terms is

$$c_t + z_t + l_{t+1} \le Ak_t^{\alpha} + (1+r_t)l_t. \tag{21}$$

Given the economy's initial capital stock and ownership of foreign assets, denoted $k_0 > 0$ and l_0, a *perfect foresight equilibrium* is a set of sequences for the shadow value of capital and quantities, $\{q_t, k_t, z_t, c_t, l_t\}$, with q, k, z and c positive, that are consistent with utility and profit maximization and clear the goods market. An equilibrium must satisfy (10), (12), (18), (20), and (21) with equality, for t=0,1,.... A *steady state* is an equilibrium with $k_t=k_{t+1}=k^*$ and $z_t = z^* = \delta k^*$. In a steady state, $z^*/k^* = \delta$, $\varphi\left(z^*/k^*\right) = \delta$, $\varphi'\left(z^*/k^*\right) = 1$, and $q^* = 1$. The steady state capital- and output-labor ratios are pinned down by the world interest rate r^*, the marginal productivity condition $r^* + \delta = \alpha \mathrm{A}(k^*)^{\alpha-1}$ and $y^* = \mathrm{A}(k^*)^{\alpha}$. In the calibration we assume that the world interest rate satisfies $1+r^* = \beta$. The representative CEE consumer's rate of per capita consumption is then constant. From the present value budget constraint, we have $c^* = \frac{r^*}{1+r^*}W$, where $W \equiv (1+r^*)a_0 + \sum_{t=0}^{\infty}(1+r^*)^{-t}(1-\alpha)k_t^{1-\alpha}$ is the present value of the consumer's wealth.

Discussion

At the beginning of the transition, the shadow value of installed capital is high, reflecting the initial economy-wide shortages of usable capital goods. The rate of physical capital accumulation is correspondingly high but, unlike in the frictionless model, capital inflows is gradual (Table 3). Over time, the shadow price of capital declines, and the economy approaches the steady state in which the shadow price of capital is unity and investment merely replaces units of capital made obsolete by physical wear and tear.

Investment and consumer demand both drive capital inflows into the early phase of the transition. The opening up of the economy to international capital flows leads to a consumption and investment boom as domestic households and firms take advantage of new opportunities to smooth consumption or augment their plant and equipment. While firms respond to adjustment costs by reducing their rate of investment (compared to a frictionless world), capital inflows are quite high, fueled by buoyant consumer demand. Correctly anticipating higher future incomes, households finance the shortfall between their permanent income and their disposable income through foreign borrowing (intermediated by the banking system). In the absence of liquidity constraints, borrowed funds allow consumers to maintain a constant optimal rate of consumption. The resulting current account deficits are reversed only later as consumer incomes rise and loans are serviced.

A model featuring traded and non-traded goods, limited intersectoral factor mobility, and liquidity constraints can better mimic observed capital inflows. Fernandez de Cordoba and Kehoe have calibrated such a model for the case of Spain, although without allowing for liquidity constraints. Combining their specification with a model of credit constraints, such as the one developed by Barro, Mankiw and Sala-I-Martin, could shed light into the relative importance of consumer and corporate foreign borrowing in driving capital inflows. Elaborating and calibrating such a model for the CEE is a useful direction for future research.

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