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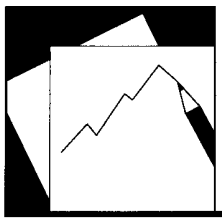

IMF Working Paper

Vulnerabilities in Emerging Southeastern Europe—How Much Cause for Concern?

Piritta Sorsa, Bas B. Bakker, Christoph Duenwald, Andrea M. Maechler, and Andrew Tiffin

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Abstract

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While large inflows of capital into Southeastern Europe (SEE) have raised incomes, this has increased vulnerability to financial risks, which, if realized, can lead to costly adjustments. Traditional vulnerability indicators in SEE have reached levels that in other countries have not been sustainable, and sectoral analysis shows rising imbalances and raises questions about efficient use of the inflows. While factors related to EU integration mitigate these vulnerabilities, weaker institutions reduce these benefits in SEE compared to more advanced European emerging markets. To insure against setbacks to income convergence, SEE policymakers should take measures to reverse the buildup of vulnerabilities.

JEL Classification Numbers: F32, F41, G21

Keywords: Vulnerability indicators, balance sheet analysis, sudden stops, capital inflows, emerging markets

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I. EXECUTIVE SUMMARY

Large inflows of capital into emerging market countries in Southeastern Europe (SEE)—Bulgaria, Croatia, Romania, and Serbia—have contributed to income convergence toward EU levels. At the same time, the catch-up has been accompanied by a considerable buildup of vulnerabilities—large external imbalances, rapid credit growth, and currency mismatches—exposing the region to financial risks. If realized, these risks can lead to costly adjustments in output. An analysis of traditional vulnerability indicators shows that in SEE they have reached levels that in other countries have not been sustainable. These results are reinforced by a sectoral analysis of vulnerabilities and sustainability of growth in this region. While factors related to EU integration are likely to increase the ability of European emerging markets to sustain vulnerabilities, these benefits are smaller in SEE than in more advanced European emerging market countries due to weaker institutions and structural reforms. The paper concludes that, to insure against setbacks to income convergence, SEE policymakers should take measures to slow or reverse the buildup of vulnerabilities.

Traditional vulnerability indicators for SEE are at levels that historically have been associated with risks for growth reversals. The pace of credit growth from domestic banks and directly from abroad is fast, and the share of foreign currency loans in the total is large by emerging market standards. External vulnerabilities in SEE are also high—both from a historical perspective and in comparison with other countries. External stock and flow imbalances in SEE are now larger than those in East Asia in 1996. Estimates of sudden stop probabilities and related output costs based on past emerging market country experiences underscore concerns with the vulnerabilities in SEE. Coupled with rigidities in the adjustment capacity, these factors increase risks for convergence setbacks in the region.

A further look at vulnerabilities in SEE using sectoral analysis reinforces concerns about the risks to smooth convergence in the region:

- **The inflows have been absorbed mainly by the nontradables sectors.** While this is likely to reflect expectations of real appreciation with rapid income convergence, it raises currency and credit risks should economic conditions change. Capital inflows have financed not only investment but also consumption. Furthermore, relatively modest GDP and productivity growth rates given such large inflows, point to problems with investment efficiency.

- **High leverage and balance sheet mismatches, mainly in the corporate sector, also increase currency and credit risks in SEE.** Corporate net foreign currency liabilities, both to domestic banks and the rest of the world, have risen considerably over the past three years. Corporate foreign currency debt is also approaching levels similar to pre-crisis Asia and Latin America. Vulnerabilities in the household sector are lower as financial net worth is positive, although declining. Banks, with large foreign liabilities and domestic foreign currency assets largely in the nontradables sector, face potentially important indirect credit and currency risks.

- **Although foreign banks have brought many benefits to SEE, the dependence on a few large banks may have biased risk pricing.** Foreign banks' exposure in SEE is a small

fraction of their total exposure, and this exposure, with centralized risk management and supervision, can lead to risk underpricing in small host countries. This asymmetric relationship and its concentration in a few foreign banks also make host countries vulnerable to the risk of sudden stops because of small changes in the parents' lending policies prompted by developments in other countries. Weak institutions and aggressive profit targets set by parents for their SEE subsidiaries may also have led local managers to underprice risk to ensure lower provisions.

At the same time, vulnerabilities in emerging Europe are mitigated by the European integration process—the "EU halo effect." The risks with large current account deficits and rapid credit growth are mitigated by benefits from EU membership, including stronger policies, institutions, transparency, access to EU funds, and lower political risk. The presence of foreign banks with strong reputations, and balance sheets has improved bank efficiency, and reduced the risk of easy pull-out, given their longer-term strategy for the region. EU integration has also facilitated deep cross-border integration and diversification in both goods and capital that boost the growth potential. Financial euroization has allowed creditors to acquire large claims without incurring direct currency risks, while expectations of euro adoption and bailout by European partners in case of trouble are reducing overall risks.

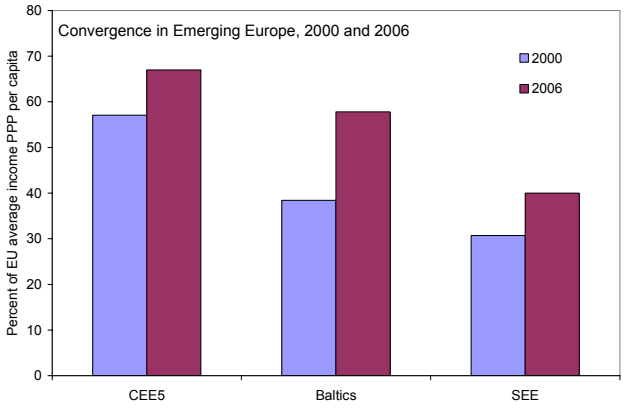
Nevertheless, the mitigating factors are weaker in emerging SEE than in more advanced European emerging markets, sustaining concerns about the vulnerabilities. SEE is a latecomer to both transition reforms and EU integration. As a result, SEE institutions are less developed than those in other emerging European countries, as evidenced by substantially worse transparency and "doing business" indicators. Weak judicial systems or accounting standards also reduce the benefits from foreign bank presence on the efficient allocation of the inflows.

In sum, vulnerabilities seem significant enough in SEE to justify policies to insure against setbacks to convergence. To contain overheating pressures and enhance competitiveness, maintaining prudent macroeconomic policies is important: fiscal policies should not be procyclical, wage policies should stay in line with productivity developments, and structural reforms to raise efficiency should continue. As the vulnerabilities are also driven by distortions in risk pricing, inadequacies in supervisory practices, and structural problems, the policy response should focus on sectoral policies that address these distortions. Stricter financial supervision and prudential measures could contain unbalanced currency exposures and improve credit quality assessments, and closer cross-border cooperation in supervision could facilitate a more adequate risk pricing at the conglomerate level. There may also be room to increase reserves as insurance against crisis risks, while the development of capital markets, including those in local currency, could reduce vulnerabilities to currency and credit risks over time.

II. INTRODUCTION

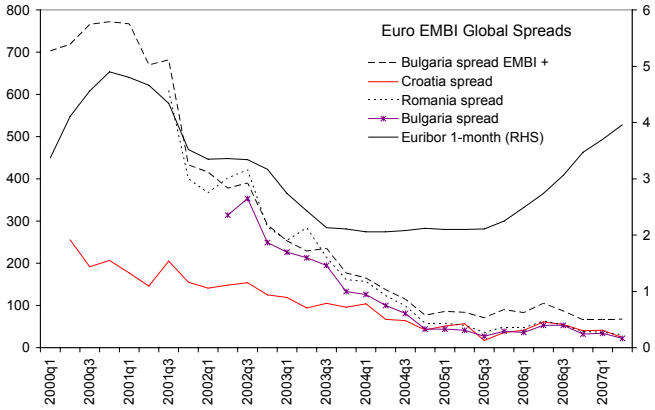
1. **Southeastern Europe (SEE)—like the rest of emerging Europe— is catching up with Western European income levels**. Between 2000 and 2006, average per capita incomes in emerging SEE—Bulgaria, Croatia, Romania, and Serbia—rose from 30 to 40 percent of average EU incomes. Despite progress, SEE remains the poorest region in emerging Europe, which in this study comprises former transition countries that are the most integrated into EU and global capital markets, namely the CEE5, the Baltics, and SEE.[1]

Relative convergence in SEE has been slower than in other emerging Europe.



2. **The catch-up has been aided by large inflows of capital.** Transition reforms and EU integration have created a virtuous circle of increased growth expectations, sound policies, better institutional frameworks, and attractive export and investment opportunities. Together with strong world growth and ample liquidity in recent years, this has contributed to smaller spreads and lower real interest rates in the region. All those factors have increased demand for capital, which has been eagerly supplied by foreigners in search of higher returns.

Bond spreads (euro bonds or EMBI) in SEE have declined sharply in recent years



3. **Rapid income convergence has been accompanied by a sharp rise in vulnerabilities in emerging SEE.**[2] Current account deficits have widened to levels that stand out even among European emerging markets, and external debt remains high, despite public debt reductions in some countries (Bulgaria and Serbia) and strong FDI (Figures 1 and 2). The inflows of capital have also fueled rapid credit growth, mostly in foreign currency. Large current account deficits are of concern, as they pose financing risks if the capital inflows stop, while the buildup of external debt increases exposure to rollover, exchange rate, and interest rate risks. These can be amplified by

[1] While SEE generally includes Albania, Bosnia and Herzegovina, *Bulgaria*, *Croatia*, FYR Macedonia, Montenegro, *Romania,* and *Serbia,* this study focuses on those SEE countries (in italics) that are the most integrated into global financial markets and therefore most exposed to changes in investor sentiment. The CEE5 comprises the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia, and the Baltics comprise Estonia, Latvia, and Lithuania.

[2] "Vulnerabilities" are characteristics of the economy that may make it prone to financial shocks; "risks" refers to events (exchange rate/interest rate movements, external shocks, policy mistakes) that can expose the vulnerabilities. The risks may materialize because of the vulnerabilities themselves or exogenous factors.

balance sheet mismatches. Rapid credit growth can increase credit risks, if quality is compromised, and it facilitates asset price booms that go bust. The materialization of these risks can lead to prolonged periods of slow growth or large drops in output in these still fragile economies.

4. **The study focuses on these vulnerabilities**. Both the Baltics and SEE stand out with very large external deficits within emerging Europe. While sustainability of convergence in the former has been covered in several studies, the four emerging markets in SEE have received less attention.

5. **Against this background, the study seeks to address two key questions:**

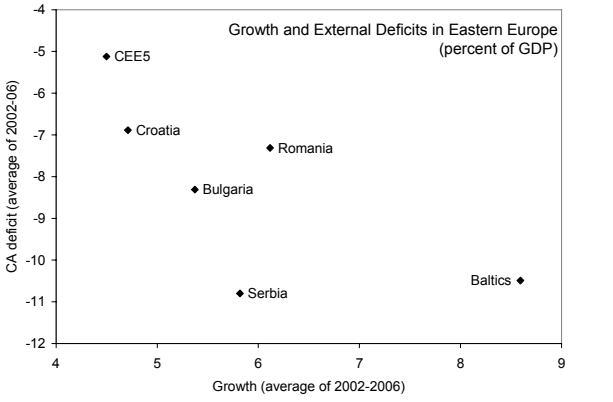
- **How serious are the risks to sustainable income convergence in SEE?** The study assesses traditional macroeconomic vulnerability indicators in SEE, including estimates of sudden stop[3] probabilities and output costs, which is complemented by sectoral analysis of (i) how the use of the inflows in SEE may have affected vulnerabilities; (ii) to what extent sectoral balance sheet mismatches may worsen vulnerabilities; and (iii) how foreign banks may transmit risks across countries.[4] This is followed by a discussion on mitigating factors related to EU integration and how they apply to SEE.

- **What can SEE policymakers do to ensure sustained growth?** The study discusses what distortions may be driving the rise in vulnerabilities, and the pros and cons of various policy options to reduce risks for growth reversals that can be prompted by the vulnerabilities.

III. Catch-up and Background to Vulnerabilities in Emerging SEE

6. **SEE countries started their transitions later than the rest of emerging Europe, creating large potential for catch-up.** Bulgaria and Romania initiated more substantive transition reforms only towards the end-of the 1990s, when years of stop-and-go policies with slow growth, and a currency crisis in the former, prompted change. In Serbia, and to some extent in Croatia, transition was delayed by wars in the 1990s related to the breakup of former Yugoslavia. Although average growth in SEE has been robust, at about 5 percent per annum since 2000, it is somewhat puzzling that, despite the larger

Despite large external deficits, relative growth performance in SEE lags behind EU peers.

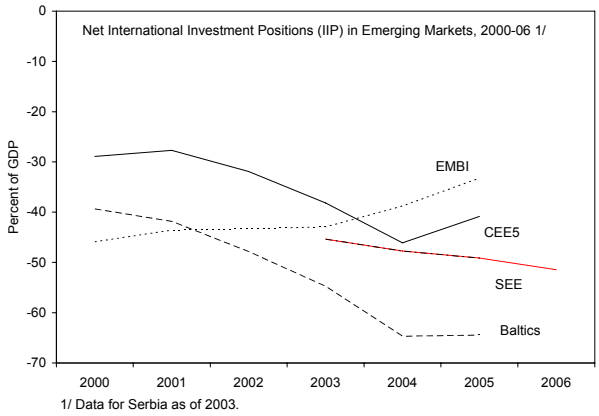


[3] The term "sudden stop" has been popularized by Guillermo Calvo, but the expression was first used in Dornbusch, Goldfajn, and Valdés (1995).

[4] Based on background notes on "How Do Vulnerabilities in Emerging SEE Compare to Past Crises and Other Emerging Markets?" (B. Bakker); "Balance Sheet Analysis of Vulnerabilities in Emerging SEE" (P. Sorsa); "The Role of Foreign Banks in Risk Transmission in SEE" (A. Maechler); and "Estimates of Crisis Risks and Output Costs in Emerging SEE (C. Duenwald and A. Tiffin)."

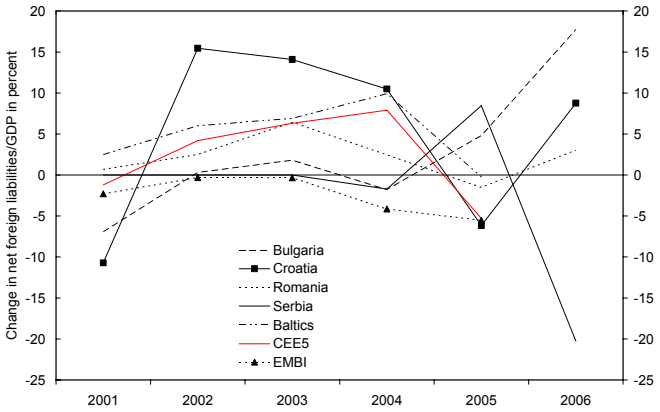
catch-up potential implied by the late start and low incomes, relative growth in these countries has been more modest than in their EU peers.

The IIP of SEE has deteriorated in recent years.



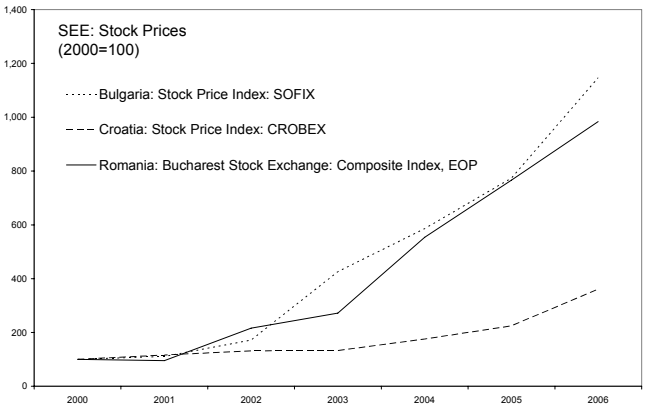
7. **Broadly prudent macroeconomic policies improved fundamentals.** Bulgaria, with a currency board, and Croatia, with a tightly managed float, have anchored policies to stable exchange rates, while Romania and Serbia target inflation within managed floats. The policy mix as relied on more or less cautious fiscal policies[5] to contain demand, with some support from monetary policy and macro-prudential measures to slow credit growth, and structural reforms to boost competitiveness. As a result, inflation in SEE declined to single digits and competitiveness improved.

Net Capital Inflows to Emerging Markets, 2001-06.



8. **The growth potential in SEE attracted large inflows of capital, even by emerging European standards.** Foreign savings have financed double digit current account deficits—more than twice those in the CEE5 but similar to those in the Baltics—driven by strong investment demand and consumption smoothing. Capital inflows have been correspondingly large, even though inflows to the private sector have been balanced by outflows from the public sector as governments have paid back debt with privatization revenues. The strong inflows have worsened the region's net international investment positions, especially of the private sector (see Figure 2), considerably so when compared with other emerging markets.

Stock markets have boomed in SEE.



9. **Foreign capital has also fed strong credit growth from domestic banks.** Domestic credit growth, at 5-6 percentage points of GDP annually, is high by emerging market standards (Figure 3). This was boosted by easy access to external finance of foreign banks, which dominate SEE banking sectors, and their eagerness to make profits in their newly acquired foreign subsidiaries and to expand market share in a potentially lucrative market. Coupled with the strong growth of

[5] Bulgaria has achieved rising fiscal surpluses, Croatia has reduced its budget deficit over the past few years, and Romania has run small deficits; meanwhile, in Serbia the surplus in 2005 was reversed in 2006.

direct credit to enterprises from abroad and intercompany loans, this factor has added to demand pressures and increased indebtedness of domestic enterprises and households, and, thereby, credit risks. Moreover, since a large part of the credit is in foreign currency, borrowers' currency risks add to banks' credit risks.

10. **The inflows have started to contribute to pressures on overheating and competitiveness in most of SEE, complicating macroeconomic management.** Although comparable and representative data are scarce, asset prices (including of stock markets and real estate) have climbed substantially, increasing potential for disruptive bursts of asset bubbles in the region. The inflows have also contributed to a recent uptick in inflation and nominal exchange rates in some countries, which has pushed up real exchange rates. While much of this is likely to reflect ongoing real convergence, possible overshooting may exacerbate current account deficits through loss of competitiveness. The export-GDP ratio in Croatia, Romania, and Serbia (which includes services) has remained largely unchanged since 2000, despite deepening EU integration and the broadly stable or slightly declining market shares in the EU (see Figure 1), which points to a mixed export performance so far. Only Bulgaria has increased this ratio more significantly, but it is matched by an even larger jump in the import-GDP ratio. These developments raise questions about asset bubbles and competitiveness going forward.

SEE: Exports and Imports of Goods and Services
(In percent of GDP)

	Imports			Exports		
	2000	2006	Change	2000	2006	Change
Bulgaria	**61**	**84**	**23**	**56**	**65**	**9**
Slovak Republic	71	90	19	69	85	16
Lithuania	51	69	18	45	57	12
Latvia	49	66	17	41	43	2
Poland	33	41	8	27	41	14
Serbia	**40**	**48**	**8**	**27**	**27**	**0**
Czech Republic	66	74	7	63	75	12
Hungary	76	83	6	72	81	9
Romania	**38**	**44**	**6**	**33**	**32**	**-1**
Croatia	**52**	**58**	**6**	**47**	**50**	**3**
Estonia	89	89	1	85	79	-6

Source: WEO

11. **The dominance of credit in the inflows has raised SEE debt to levels that are among the highest in emerging Europe.** External debt-to-GDP ratios ranged from 36 percent in Romania to over 80 percent in Bulgaria and Croatia in 2006, which with the Baltics are among the highest in emerging Europe. The bulk of the inflows is credit to enterprises and banks. While banks have relied on foreign debt to finance domestic credit growth, direct foreign borrowing by enterprises is even higher in most of SEE. FDI inflows have been large, but they also cover intercompany loans, which has added to private debt. This also means that the nondebt coverage of external deficits is smaller than reported by many analysts. In recent years, the share of short-term debt is up, especially in Bulgaria and Croatia. These factors raise financing and rollover risks in SEE.

SEE: Private Sector International liabilities by type
(percent of GDP)

	FDI 2005	Total Pr. Debt 2006	Of Which: Intercompany Debt	Other for. Debt of Enterprises	For. Debt of Banks
Bulgaria	27	60	17	26	17
Croatia	24	50	5	20	25
Romania	26	36	8	15	13
Serbia	20	47	...	23	24

Sources: IMF IIP; and NBS (excludes domestic foreign currency loans, and for. liabilities in domestic currency).

IV. Is Convergence Sustainable in Emerging SEE?

A. Traditional Vulnerability Indicators in SEE

12. **This section examines vulnerabilities in SEE in light of previous episodes of financial turmoil in emerging markets.** Although each crisis has its idiosyncratic features a comparison of SEE with past financial turmoil in emerging markets can help identify sources of vulnerabilities in

the region. Given past crisis episodes, the following concerns emerge about current vulnerabilities in SEE:

- **Large external deficits carry sudden stop risks.** Emerging markets tend to be more vulnerable to sudden capital flow reversals than advanced countries because of greater financial market imperfections, such as liability euroization, and limited access to longer-term capital and equity finance (Calvo,1998). Since the emerging market crises of the 1990s, many studies have shown that rising vulnerabilities, including large external deficits and debt, and financing risks were highly correlated (Kaminsky, Lizondo, and Reinhart 1998).[6]

- **High debt tends to increase currency, interest rate, and rollover risks, which can be amplified by balance sheet mismatches.** In past financial market turmoil, when debt has not been rolled over, the resulting financing gaps have required a drawdown of reserves or higher interest rates. This often led to pressures on the exchange rate, which in turn affected bank portfolios, as holders of foreign currency or variable interest rate debt found it difficult to make repayments (Roubini and Setser, 2004). The impact of the shocks was amplified by liability euroization in emerging markets influenced by asymmetries in international capital markets. The "original sin," or greater difficulty of emerging markets to raise capital in domestic currency compared with industrial countries, has been an important source of balance sheet mismatches.

- **Rapid credit growth tends to generate nonperforming loans raising credit risks.** This has been one of the best predictors of banking sector problems in emerging markets (Kaminsky and Reinhart, 1999). As the volume of credit grows, banks' ability to assess credit risks becomes overstretched, affecting the quality of portfolios. While this can also be a problem in advanced countries, it tends to be more acute in emerging markets with weaker institutional frameworks or lower human capital.

- **Large imbalances can also lead to a vicious circle of worsening deficits and rising solvency risks in fragile economies.** Rising foreign liabilities tend to require increasing interest and dividend payments, which can further widen large current account deficits and possibly exacerbate sustainability problems. Large capital inflows have often appreciated the REERs, which, in turn, has further aggravated external deficits and led to concerns of overvaluation and speculative attacks. If the inflows have been absorbed by nontradables sectors, concerns about capacity to service the debt increase solvency risks.

13. **Evidence from other emerging market countries suggests that growth with large imbalances has seldom been sustainable.** A recent survey of the literature by Kose and others (2006) concluded that there is no firm consensus on the contribution of foreign savings to growth. Excessive buildup of vulnerabilities often led to crisis or painful adjustments and aborted growth, as either policy failures or changes in investor sentiment caused sudden stops of external financing. Moreover, even in the absence of a V-shaped financial crisis, the mounting real and financial

[6] However, as noted by Blanchard (2007), the Asian crisis shows that sudden stops can occur even in the absence of large current account deficits.

imbalances could lead SEE down a slow growth/high debt path and delayed catch-up, similar to the experience of Portugal.

14. **In SEE, traditional vulnerability indicators are currently at levels that historically have been associated with risks of growth reversals.** Based on analysis of past financial crises in emerging markets, the now wide literature has identified indicators of underlying vulnerabilities that either were closely related to sudden reversals of capital inflows or exacerbated their impact on the economies. These early warning indicators are often divided into external, public, financial, and corporate sector vulnerabilities.

- **A comparison with pre-crisis East Asia shows that current external vulnerabilities in most of SEE are similar or worse.** Current account deficits in SEE are twice as large, and external debt is about 20 percentage points of GDP higher than in East Asia. Adjusting for FDI or taking net instead of gross debt reduces the differences somewhat but does not eliminate them. East Asia also had large FDI inflows, and net debt in Korea was only 9 percent of GDP in 1996. On a number of other indicators, SEE also scores somewhat worse than East Asia—growth is lower, and inflation is higher. Only reserve cover is better in SEE than in pre-crisis East Asia.

Vulnerability Indicators for Selected Regions
(2006, percent of GDP, mean for regions)

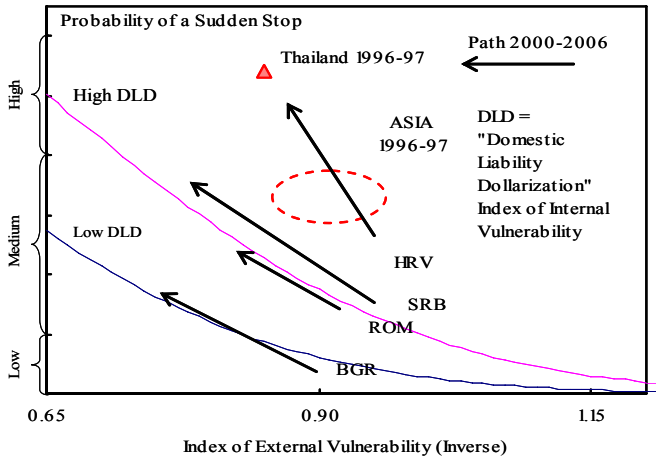
	East Asia 1/ 1996	SEE 2006				
			Bulgaria	Croatia	Romania	Serbia
Current Account	-4.4	-11.3	-15.8	-7.8	-10.3	-11.5
External Debt	49	68	78	89	42	61
Reserves to short term debt 2/	59	167	135	100	125	306
Reserves to s.t. debt plus c.a. deficit	...	85	76	74	64	125
Fiscal Balance	1.1	-0.7	3.5	-3.0	-1.7	-1.5
Public Debt	24	31	25	41	19	39
GDP growth	7	6.1	6.1	4.8	7.7	5.7
Inflation	5.9	7.4	7.3	3.2	6.6	12.7

1/ Indonesia, Korea, Malaysia, Philippines, Thailand
2/ Residual maturity.

- **Comparisons with other emerging markets confirm that external vulnerabilities, the speed of credit growth, and liability euroization are high in SEE**. Current account deficits in SEE are among the highest in a sample of 48 emerging market countries (Figure 3). These indicators also show that the speed of credit growth is faster and the extent of liability euroization is larger in SEE than in other emerging markets. Credit growth has been particularly rapid in Bulgaria (Latvia and Estonia are the only two countries where the credit-to-GDP ratio has grown faster), and is catching up in the other SEE countries. After Lebanon, Croatia has the largest share of foreign currency loans in total loans of all emerging markets. On the other hand, public sector vulnerabilities, especially debt and fiscal deficits, are lower in SEE than in other countries.

- **Vulnerability indicators in SEE are also moving in the wrong direction.** For example, current account deficits and private sector debt in part of SEE have increased in recent years (see Figures 1 and 2), with few signs of slowing. The same applies to credit growth, which continues to rise rapidly.

15. **Empirical estimates of sudden stop risks also show high vulnerabilities in SEE.** Sudden stop probabilities were estimated with a model based on work by Calvo, Edwards, and others (Appendix). The results, applied out of sample to SEE, show that the probability of a sudden stop increased between 2000 and 2006, especially in Croatia and Serbia. The probabilities are driven by the rising degree of euroization and the extent to which tradable consumption is "financed" from abroad. In Bulgaria and Romania, the probability of a sudden stop has partly been kept in check by high FDI. Although the relatively narrow definition of tradables may bias the estimates upward, this would not change the basic result that these probabilities have risen significantly over the past few years.



16. **Estimates of output costs from sudden stops are high in SEE, reflecting the nature of vulnerabilities.** A sudden stop is estimated to reduce growth between 6½ and 8½ percentage points in the four countries in the first year after the shock, which is driven mainly by the high liability euroization. The growth impact would be noticeably less if the countries managed to reduce their current account deficits (last two columns of table). Output costs could be further aggravated by institutional weaknesses in SEE that reduce adjustment capacity and complicate debt-workouts and bankruptcy proceedings.

Estimation Results: Impact of a Sudden Stop on GDP Growth

Country	Current Account Deficit, 2006	Vulnerability Indicator (1-ω)	Baseline		With a 5 ppt reduction in the Current Account Deficit	
			Growth impact of sudden stop	Recovery in t+1	Growth impact of sudden stop	Recovery in t+1
Romania	10.3	0.182	-7.4	4.1	-5.9	3.8
Bulgaria	15.9	0.250	-8.5	4.2	-7.2	4.1
Croatia	8.1	0.129	-6.4	3.9	-5.1	3.5
Serbia	12.1	0.225	-8.1	4.2	-6.5	3.9

Source: IFS, BIS, World Bank, author's calculations.

B. Sectoral Assessments of Vulnerabilities in Emerging SEE

17. **This section uses sectoral data to further understand vulnerabilities in SEE.** The detailed analysis should inform the debate on vulnerabilities and improve information for policy decisions. Specifically, this section discusses (i) uses of the inflows; (ii) sectoral balance sheet mismatches; and (iii) and the role of foreign banks in risk transmission.

Uses of the inflows

18. **The sources and uses of capital inflows matter for the sustainability of catch-up.** Countries' ability to pay back foreign liabilities is linked to the nature of the inflows—FDI or debt—and whether they support efficient investment and exports with sustained returns. FDI flows that boost productivity and technological upgrading, especially in the tradables sector, are most sustainable as they boost competitiveness and exports. Debt flows into the nontradables sector can be more worrisome—while they may improve productivity, they may not generate foreign currency earnings. Large inflows to nontradables sectors, especially into real estate, have often led to credit booms, rising asset prices and wages, and to additional shifts in production from the tradables to the nontradables sector. With rising demand for imports and a declining supply of tradables, current account deficits can continue to widen. Inflows that boost consumption can be least sustainable, as they are less likely to generate exports.

19. **Empirical studies have shown that growth tends to be more sustainable in countries with strongly performing tradables sectors.** While many of the studies cover groups of developing countries (Johnson and others (2006), Rodrik (2006), and Jones and Olken (2005)), Ireland is an example in Europe of rapid and sustainable catch-up with large capital inflows, in particular FDI, that boosted export production. Portugal, on the other hand, is an example of stalled catch-up, with large inflows of capital into consumption and investments in nontradables, including real estate. The widening current account deficit became unsustainable as competitiveness was lost following real exchange rate appreciation, and the boom turned bust as growth slowed down (Box 1).

Emerging Europe: Share of FDI in Tradables
Percent; stock, 2005 or latest available

	Bulgaria	Romania	Croatia	Serbia	CEE5	Baltics
Tradables (manufacturing and mining)	**22**	**46**	**36**	**20**	**42**	**20**
Nontradables	**78**	**54**	**64**	**80**	**58**	**80**
Trade	13	15	8	23	14	14
Transport	26	12	16	0	7	9
Financial interm.	20	11	28	37	18	27
Real estate	9	6	2	12	11	15

Sources:WIIW; NBS

20. **The bulk of the capital inflows in SEE have been absorbed by the nontradables sectors.** In most of SEE only about one-third or less of the stock of FDI, foreign debt, and domestic foreign currency credit is in the tradables (manufacturing) sector. The definition of tradables covers manufacturing, which is the main export sector, and sensitivity analysis with a broader definition of tradables, including transport or some tourism-related service sectors, did not materially change the results. This situation points to increased indirect currency risks in sectors with limited foreign currency revenues. While half of Romania's FDI went into tradables (in line with CEE5), the share was only one-fifth in Bulgaria and Serbia (similar to the Baltics). Financial intermediation, trade, transport, hotels, and real estate have been the largest recipients of FDI inflows in SEE. In Bulgaria the subsectoral distribution of foreign debt and domestic foreign currency loans is similar (Figure 4).

SEE: Share of Tradables in Corporate Foreign Currency Loans, 2005

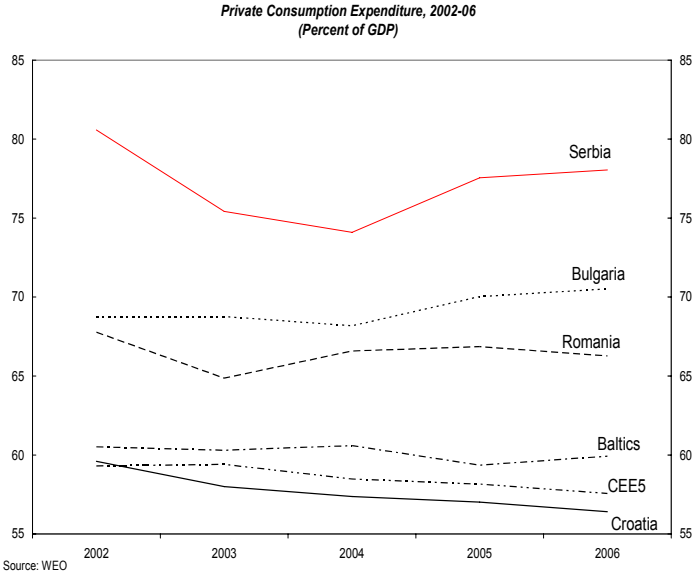
	Loans from Abroad	Domestic Loans Total (in Foreign Currency)
Bulgaria	21	31 (28)
Croatia	...	42 (...)
Romania	...	36 (...)
Serbia	38	...

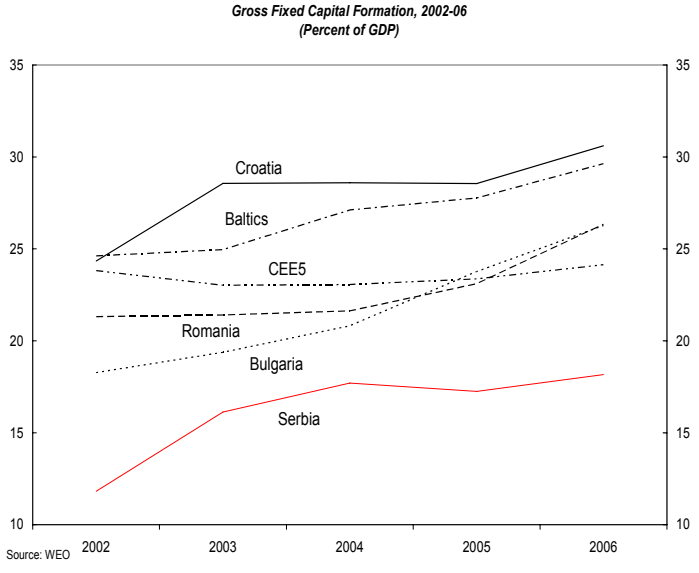
Sources: Central banks; staff estir

SEE: Total factor productivity growth	***2002-2006***	
Bulgaria	1.8	
Croatia	1.2	
Romania	4.8	
Serbia	...	
Baltics	4.0	
CEE5	2.5	
Source: Haver analytics		

21. **The dominance of nontradables sectors is likely to reflect strong expectations of real appreciation as incomes converge to EU levels.** This makes returns in nontradables more attractive. The investments may also have been influenced by weak institutional frameworks that make investing in activities with short pay-off periods, such as trade and real estate, more appealing than manufacturing. However, the appreciation expectations may overshoot. Together with the apparent currency mismatch, the increase in liabilities in nontradables sectors can affect the countries' ability to service debt liabilities over time, especially should there be large movements in the exchange rate or a slowdown in growth.

22. **There is evidence that an important part of the inflows in SEE have fed consumption, and that efficiency of investment has been low**. Relative levels of consumption in SEE have been high and rising slightly, except in Croatia, suggesting that at least part of the capital inflows and credit has financed consumption. At the same time, investment levels in Romania and Bulgaria have risen in recent years, approaching those in CEE5 but still falling behind the Baltics. Efficiency of investment seems to be an issue—for example, the relatively high investment ratios in Croatia, at the level of the Baltics, have generated only moderate growth. This may reflect the impact of the weaker institutional framework on the efficiency of investment allocations, as well as the absorption of a large part of the inflows by nontradable sectors, which tend to have lower productivity.[7] In addition, TFP growth rates in Bulgaria and Croatia have been lower than in the Baltics and the CEE5 (Romania scores higher on this metric). However, reliable sectoral productivity estimates are not available. This pattern of catch-up raises questions about sustainability of the large deficits, should the global environment change.

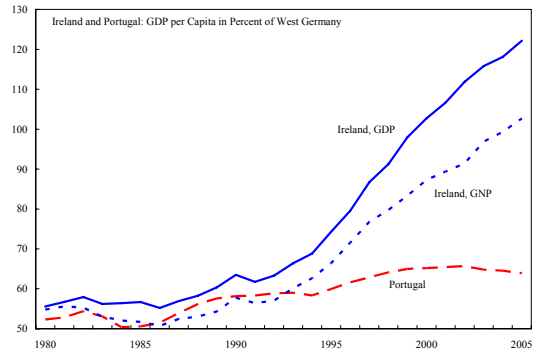




[7] Higher productivity growth in nontradables would tend to depreciate the real exchange rate (the reverse of the so-called Balassa-Samuelson effect), which is not the case in SEE.

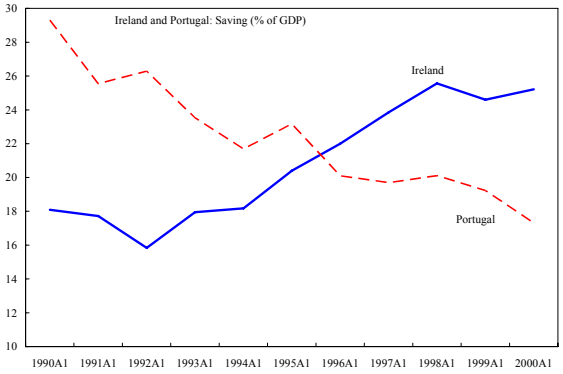
Box 1. Catch-Up: The Different Experiences of Ireland and Portugal

Ireland and Portugal offer an interesting contrast on the sustainability of catch-up. Between the mid-1980s and euro adoption in 2000, both Ireland and Portugal were catching up. From 2000 on, however, Ireland continued to catch up, while Portugal started to revert.



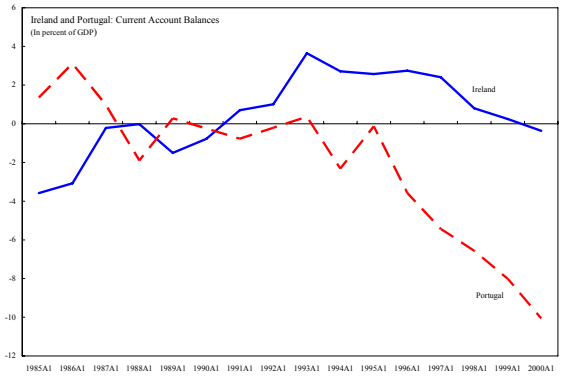
The main differences are in wage policy and the use of the capital inflows.

In Ireland, large FDI flows into the manufacturing sector contributed to a sharp increase of the tradables sector, an export boom, and a rapid rise of total factor productivity (TFP). As wages lagged TFP, the unit-labor-cost-based REER declined sharply, boosting profitability of the export sector and leading to a sharp increase in corporate saving. As government saving increased as well, the investment boom did not worsen the current account—on the contrary, savings increased faster than investment, and the current account balance moved into surplus.



In Portugal, large capital inflows—in the nontradables sector rather than manufacturing—fed a domestic demand boom and a surge in imports. In the absence of a large presence of foreign firms, TFP growth lagged. As wage growth exceeded TFP, profit margins in the export sector were squeezed, stimulating a decline of the tradables sector. With little improvement in the government balance and a decline in corporate savings, total saving declined, widening the current account deficit.

In short, Ireland and Portugal had a different catch-up model. Ireland caught up through an expansion of supply and of the tradables sector; Portugal through expanding demand and of the nontradables sector.



The problem in Portugal arose when the boom came to a halt in 2001 and GDP stagnated. Labor productivity growth stopped, leading to a further deterioration of competitiveness, which maintained the current account deficit high. Portugal was in a slump but could not get out of it. With high and increasing fiscal deficits, and no independent monetary policy, there was no room to stimulate domestic demand. But the tradables sector had become too uncompetitive to drive the economy, yet with euro membership, exchange rate adjustment was no longer an option.

Why was Ireland so successful in attracting FDI in manufacturing? Both good policies and fortunate circumstances were important. Good policies included prudent fiscal policy, low taxes on labor and business income, and flexible labor and product markets. Fortunate circumstances included favorable demographics and participation in the EMU.

Balance sheet analysis (BSA)

23. **This subsection uses balance sheet analysis to strengthen the assessment of vulnerabilities in SEE.** BSA is a way to gain insights into currency, liability, or maturity mismatches in net *financial* assets and liabilities *between* sectors (intrasectoral linkages are netted out). This can be useful in detecting risk exposures of, and between, various sectors, hidden in aggregate macroeconomic data. The inclusion of only financial assets and liabilities (real assets like real estate are excluded) explains why net liabilities can differ from zero—in contrast to "accounting" balance sheets that always balance. The inclusion of FDI and domestic equity varies in existing BSA studies, often depending on available data.

24. **SEE's largest balance sheet mismatches are in the corporate sector.** Net corporate foreign currency liabilities are particularly high in Bulgaria and Croatia at over 40 percent of GDP (excluding FDI) in 2006. This is above levels reported, for example, for Latvia (32 percent of GDP in 2005), although differences in definitions and lack of other studies make benchmarking across countries difficult. The implicit currency risk is even greater, if the holders of assets and liabilities differ, which may well be the case in practice (Calvo, 1998). Corporate net financial liabilities have also been going up in recent years in most of SEE, especially to domestic banks and the rest of the world (Figure 5), pointing to potentially rising credit risk as well.

25. **Another measure of vulnerabilities is corporate foreign currency debt, which in SEE is at levels similar to pre-crisis Asia and Latin America.** Although the data exclude intrasectoral liabilities, they show that Bulgaria's corporate foreign currency debt at about 60 percent of GDP is higher than in pre-crisis Thailand in 1996. This debt of the remaining SEE countries at 30-60 percent of GDP exceeds levels reached in Argentina, Brazil, Korea, and Uruguay before their crises of the past decade. The combination of currency mismatches and rising overall private sector foreign currency indebtedness add to the region's vulnerability to credit and currency risks.

26. **The currency risks are amplified because much of the corporate foreign currency exposure seems unhedged.** As discussed above, the bulk of foreign, and domestic foreign currency liabilities are held by the nontradables sector in SEE. This was also the case in Argentina in 2001 before its episode of financial turmoil. The large size of these liabilities—for example, the foreign currency debt of the nontradables sector was over 30 percent of GDP in Bulgaria in 2006—further aggravates the country's vulnerability to currency and credit risks.

27. **A rise in net foreign liabilities, coupled with large exposure to the leveraged enterprise sector, is raising direct and indirect currency risks in banks.** Although banks' net total foreign currency positions in SEE are mostly positive (see Figure 5), their net liabilities to the rest of the world have increased. Banks are taking foreign loans to complement domestic deposits to finance booming credit growth. While most of the loans are from parent banks, the exposure to currency risks increases nevertheless, especially as many of the domestic foreign currency assets (loans) are to unhedged clients. Lack of comparable data across countries on bank net liabilities makes cross-country comparisons difficult, including with past emerging market crises. The cross-sectoral data

do show, however, that, given the banks' exposure to potentially unhedged enterprises, any shocks that affect the corporate sector could rapidly be transmitted to domestic banks. [8]

Structure of Corporate Sector Foreign Exchange Liabilities - SEE in 2006 and Selected Emerging Markets Before Crisis Episodes (Percent of GDP)

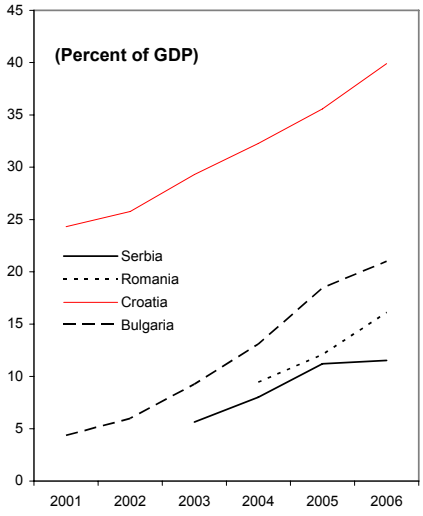
	Bulgaria 2006	Croatia 2006	Romania 2006	Serbia 2006	Argentina 2000	Thailand 1996	Korea 1996	Brazil 2001	Uruguay 2001
Corporate sector foreign exchange liabilities									
Foreign currency debt to domestic banks	17	22	9	15	11	18	6	4	26
Foreign currency debt to external creditors	43	27	23	23	13	34	6	14	6
Total foreign currency debt	60	49	32	38	24	52	12	18	32

Sources: Staff estimates; and Rosenberg and others (2005).

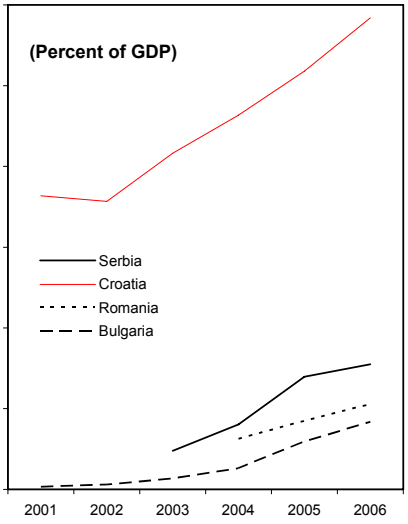
28. **Banks are also engaging in carry trades, especially in Serbia more recently.** In 2006, banks in Serbia borrowed about 8 percent of GDP from abroad. This is close close to the additional amounts they invested in repos domestically in response to attractive interest rate differentials and an appreciating currency .[9] As a result, bank assets at the central bank increased from 24 to 40 percent of total—twice the amount of credit to enterprises. These positions increase sudden stop risks in Serbia.

29. **On the positive side, household balance sheets in SEE show positive although declining net financial worth.** This compares favorably, for example, with Latvia and Hungary, which reported net foreign currency liabilities of about 9 percent and 5 percent of GDP, respectively, in 2005 (IMF country reports 06/353 and 06/379).[10] Apart from cash, households' financial assets and liabilities in SEE are mainly with banks, given the undeveloped nature of the region's capital

Household gross liabilities have been rising in SEE...



...with forex liabilities highest in Croatia.



[8] Current stress-tests indicate that banks could withstand large shocks in SEE. Capital adequacy ratios remain at or above emerging market average but have been declining in recent years.

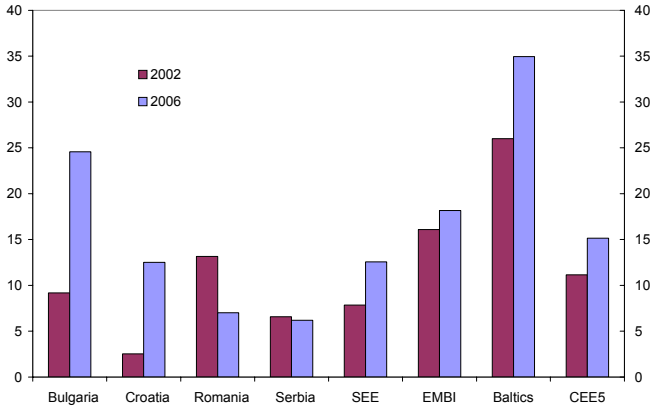
[9] The dinar repo interest rates were around or above 10 percent during 2006, while the dinar/dollar rate appreciated by about 17 percent over the period creating attractive arbitrage opportunities for banks borrowing abroad.

[10] *GFSR* September 2006 had additional comparisons with selected emerging markets that point to positive total net asset positions. However, problems with coverage and definitions make direct comparisons difficult. The GFSR data are likely to include a broader definition of assets including stocks and mutual funds.

markets.[11] The positive net positions reflect rising bank deposits and might be due to the still low pensions and minimum down-payment requirements for loans, or to the concentration of loans in a limited group of households. Furthermore, household total and forex liabilities in most of SEE still account for a small share of GDP (see charts). However, rapid credit growth is gradually reducing net financial worth, including in foreign currency, especially in Croatia and Romania.

30. **Maturity mismatches seem low.** Maturity mismatches in SEE seem contained in all sectors, although the data are less satisfactory. This reflects problems with classifications and the fact that a loan from a parent bank or enterprises booked as long term may in practice be called at any time. Only banks in Croatia seem to have some small uncovered short-term foreign currency liabilities. Short-term debt, however, has increased in Bulgaria and Croatia in recent years raising rollover risks.

The share of short-term debt in GDP has risen in parts of SEE in recent years.



The role of foreign banks in risk transmission

31. **This section looks into various risks transmitted by foreign banks in emerging Europe.**[12] Mispricing of risk can arise as banks are run as European-wide conglomerates in terms of risk management, while macroeconomic consequences of financial turmoil in their (small) subsidiaries fall on host countries. The perception of risk of a given exposure in SEE may be small for a European financial conglomerate, but large for the small host country. Other sources of potential risk mispricing include the quest for short-term profits and market share, and high concentration of funding:

BIS banks' exposure to SEE and other emerging Europe, December 2006
(Percent, unless otherwise indicated)

	Total US$ bn	Austria	France	Germany	Italy	Netherlands	Switzerland
Creditor country banks' share in foreign exposure of							
Bulgaria	19	18	6	6	11	2	11
Croatia	63	40	11	6	36	0	0
Romania	93	38	11	20	4	6	4
Serbia	13	44	5	3	13	1	8
SEE	191	37	10	12	16	3	4
CEE5	445	24	9	15	10	6	1
Baltics	84	2	0	7	0	0	0
Share in creditor country banks' foreign exposure of							
Bulgaria		1	0	0	1	0	0
Croatia		6	0	0	5	0	0
Romania		9	0	1	1	0	0
Serbia		2	0	0	0	0	0
SEE		18	1	1	7	0	0

Source: BIS

[11] There are no data on household equity holdings, but these are assumed to be small, at least in foreign currency. The data may also underestimate household assets, if they have holdings abroad, money under mattresses, or capital in the informal sector. There are no data on household savings in SEE.

[12] The discussion does not distinguish between branches or subsidiaries in host countries. While this distinction is important for supervision and crisis management, from the parents' perspective, the increasing centralization of business operations at the group level makes the corporate structure less relevant operationally, all else being equal. See Dermine (2006) for a review of determinants of corporate structure, Cerutti, Dell'Ariccia, and Martinez Peria (2005) for trends in this area, and GFSR (2007) for risk implications of financial globalization in emerging markets.

- **The drive of European parent banks to complement limited earnings opportunities at home with high profits from emerging Europe may have led to risk under-pricing.** Foreign banks tend to earn a large part of their aggregated profits in SEE on a fraction of total assets. According to some banks, this has led parents to set high return on equity (ROE) targets for their affiliates in SEE—between 20 to 25 percent before tax, compared with an EU average of 14 percent. To meet the profit and market share targets, local managers may have an incentive to generate rapid loan growth while downplaying risks and thus provisions—a mechanism that has also been at work in the US mortgage sector in recent years. While contributing to higher profits, this mechanism can lead to a potential build-up of credit risk in banks' balance sheets.

- **This underpricing may be compounded by limited data on creditworthiness and weak institutions in SEE.** Due to poor accounting and auditing standards, unreliable financial disclosure, and absent or incomplete credit registries, data on borrowers' creditworthiness are often missing or insufficient in SEE countries. As foreign banks cannot use their standard risk tools to measure credit risk, local managers may be forced to rely on judgment, and parent banks may not be able to independently validate the risk pricing applied in their subsidiaries.

- **Foreign banks' centralized risk management systems can further contribute to risk mispricing from the hosts' perspective in group-wide risk assessments.** Many foreign banks operate their foreign affiliates as branches, with central management of lending and treasury operations (GFSR, April 2007). This centralization may lead parent banks to underprice risks in a small foreign affiliate as risks are managed according to the group's capacity to absorb shocks, and not the affiliates.[13] This bias is aggravated by large asymmetries in risk exposure—SEE exposures are only a fraction of total assets of most foreign banks. Thus a shock with a minor impact on the group can have major consequences for the host country, especially if the affiliate is systemically important locally.

- **Consolidated supervision at the group level may also focus on risks for parent banks rather than risks for host countries.** Local supervisors tend to rely on parent banks' home supervisors to monitor changes in the risk profile of their foreign affiliates. Home supervision, however, is mostly done on a consolidated risk basis, focusing on a parent's ability to absorb a wide range of shocks—rather than on the impact of the shock on affiliates. As a result, home supervisors may not take specific actions or provide relevant information to host supervisors in a timely manner, with potentially significant consequences for the local financial system.

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[13] In particular, under Basel II, the risk weights attached to a bank's foreign exposures tend to reflect only the idiosyncratic risk of each host country—not the vulnerability of a group's overall exposure to a common shock, which is more difficult to quantify and which depends on return correlations. Furthermore, bank groups can deduct their estimated international diversification benefits from their group-wide capital requirements; however, there remain large uncertainties about how these benefits are to be measured and how robust they are. The need to carefully manage risks in banks with foreign exposures in Eastern Europe is also discussed in Hilbers and Tieman (2007).

- **The regional concentration of funding increases contagion risks in host countries**. 11 foreign bank groups account for over 70 percent of total SEE bank assets, and even larger shares of credit, in all but Serbia (Figure 6). As a result, new information or developments in other markets may lead parents to change their exposure to a particular foreign affiliate, regardless of its performance.

- **Foreign banks' funding structures may also have raised currency risks in the region.** To match foreign liabilities, mostly from their parents, banks often prefer foreign currency or euro-indexed loans to reduce currency mismatches in their balance sheets. The large mismatches in the corporate sector and inflows of foreign currency credit to nontradables sectors suggest that this practice may have led to large indirect currency risks in banks' balance sheets that may be largely unprovisioned, either because of insufficient data or institutional arrangements. For example, in view of its currency board arrangement, supervisors in Bulgaria do not consider euro loans as foreign currency loans.

- **Empirical evidence confirms some of these points.**[14] While it is generally believed that foreign banks provide financing with domestic shocks in host countries, studies that extend the analysis to shocks in the home country or other host countries find that the picture is more nuanced. Peek and Rosengren (1997) discovered that, when Japanese banks suffered capital losses after a sharp drop in the stock market, local lending in their U.S. subsidiaries was reduced by more than in their home market. Other studies show that contagion can be important, as changes in claims on individual host countries have been correlated with those in other host countries (Martinez Peria and others, 2005; and Van Rijckeghem and Weder, 2003). In Croatia, when Rijecka Banka, a foreign subsidiary of German Bayerische Landesbank Girozentrale, suffered large currency losses in 2002 the parent bank did not come to the rescue. While there are likely to be several counter examples, this suggests that foreign banks are not always acting as lenders of last resort to their subsidiaries.

- **To quantify the potential risk transfers by foreign banks, the study attempted to use the contingent claims approach (CCA).** The CCA provides a framework that combines forward-looking market information and balance sheet data to evaluate risk transmission between sectors or entities. However, data deficiencies in SEE (small number of listed companies, etc.) did not allow for a comprehensive assessment. Instead, Box 2 provides an overview of the methodology with a case study on Bulgaria, the further development of which could be an important tool for SEE authorities to assess vulnerabilities.

32. **Sudden stops and growth reversals could be triggered by several factors in SEE.** They can be exogenous—such as adverse regional or global economic or political events—or internal domestic developments, such as policy mistakes. In either case, a loss of confidence could trigger a sudden and large portfolio adjustment—a sudden stop. Such triggers in SEE could be a sudden

[14] Dages, Goldberg, and Kinney (2000) have found that foreign banks sustain a higher credit growth and lower lending volatility than their domestic counterparts in crisis periods. Similarly, De Haas and Van Lelyveld (2000) have found that foreign bank claims did not seem to retrench during recent crises in Central and Eastern Europe. Claessens and others (2001) review the literature on the role of foreign banks in transmitting financial contagion.

unwinding of global imbalances and disorderly exchange rate adjustment, loss of competitiveness, slowdown in world growth, increase in risk premiums, difficulties in parent banks' home or other foreign markets, or a fundamental reassessment of SEE prospects of joining the EMU (Bulgaria) or EU (Croatia, Serbia). SEE may be less affected by a liquidity shock than risk repricing and growth shocks—capital markets remain underdeveloped, portfolio inflows are insignificant, and foreign bank exposure to the region remains a small share of their total exposure with high profits. In contrast, a reappraisal of risk in emerging Europe can trigger changes in supply and demand for credit, which can be reinforced by the concentration of the inflows in a few foreign banks and countries. A growth shock or a decline in housing prices, or just a reduction in new credit, can trigger large adjustments in demand in SEE due to the high reliance on foreign savings in the enterprise and banking sectors.

Box 2. The Contingent Claims Approach (CCA) and Vulnerabilities in Bulgaria

CCA framework is used to assess the role of foreign banks in SEE in transferring risks across sectors. Based on the Black-Scholes-Merton option pricing theory, it combines forward-looking market information and balance sheet data to capture the non-linear nature of risk transmission between sectors or entities.

However, the lack of detailed market and accounting data in SEE allows only for a stylized CCA-type exercise. This was conducted for Bulgaria using publicly available data whenever possible and supplementing remaining gaps by estimates (over 80 percent of SEE bank loans are from foreign subsidiaries for which no traded equity data is available). In this framework, foreign banks contribute to financial stability risks through two channels: (i) rapid credit growth, which generates large exposures by the corporate sector to banks with potential credit risk buildup; and (ii) foreign banks' reliance on foreign funding to finance their credit expansion, which generates large parent-affiliate exposures and a vulnerability to a sudden stop. Owing to data constraints, it is important to note that the results are only an indication of how particular risk transfer mechanisms work, rather than a strict quantification of their potential impact.

Foreign banks seem resilient to a sizable deterioration in loan quality, provided the shock is limited to credit risk. If concerns about credit risk buildup rise, banks are likely to respond by shortening the maturities of their private sector claims and by refusing debt rollovers (shock 1). This would raise credit spreads in the corporate sector (by 300 bp) but have little impact on foreign banks' spreads (equity value (MVE) would fall by 5 percent and spreads would rise by 5 bp). If the credit risks materialize and the value of corporate assets (MVA) declines by 20 percent (shock 2), the market value of the foreign banks' equity falls by 19 percent, and credit spreads increase by 24 basis points, which would be sustainable. However, if the credit risks were to spread and affect 25 percent of the banks' other assets simultaneously, the value of their equity could fall by 55 percent (shock 3).

Shock	Fall in Corporate Assets (%)	Rollover Liquidity	Fall in Bank Assets (%)	Corporates		FOB			DOB	
				EL/A	Spread	% chg MVA	Spread	% chg MVE	% chg MVA	Spread
0	0	High	0	1.0	164	0.0	97	0.0	0.0	109
1	0	Low	0	3.6	469	-1.6	104	-4.6	-1.3	118
2	20	Low	0	14.4	1,501	-6.4	127	-18.9	-5.4	149
3	20	Low	25	14.4	1,501	-19.0	220	-55.1	-19.8	322

The results also suggest that financial markets expect foreign subsidiaries to be supported financially by their parent banks in case of financial distress. In the baseline, the corporate sector has the largest credit spread (164 basis points), followed by domestic banks (DOB-109 basis points) and foreign-owned banks (FOB-97 basis points). As credit spreads rise, the margin between domestic- and foreign-owned banks widens significantly, reflecting the implicit guarantee of bank groups to their affiliates.

If corporate losses are funded through current and future profits, they could significantly impact banks' profitability. Expected losses must be provisioned, either by drawing down profits and/or capital buffers, resulting in a lower expected ROE, which, if significant, could lead parent banks to curtail lending in that market. Assuming that all corporate losses not reflected in a lower equity market value are absorbed by current and future profits, a 20 percent fall in corporate assets would halve ROE, but not affect future profits (shock 4). A 40 percent fall, however, would wipe out current profits and possibly next year's profits as well (shock 5).

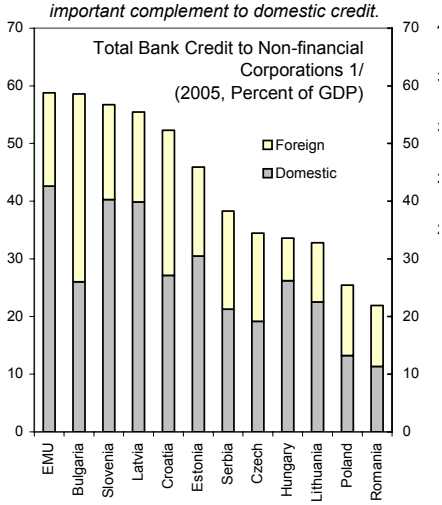
	In EUR mio	Pre	Post	Change (%)	Change	Losses absorbed by future profit
Shock 4	MVA	13460	13249	-1.6	-211	
	MVE	2947	2811	-4.6	-136	
	Profits	**146**	71	-51.2	**-75**	**0**
	ROE	5.0	2.5	-48.9		
Shock 5	MVA	13460	12594	-6.4	-866	
	MVE	2947	2390	-18.9	-557	
	Profits	**146**	0	-100.0	**-146**	**-163**
	ROE	5.0	0	-100.0		

If capital allocation by parent banks depends on their foreign affiliates' ability to meet certain ROE targets, shocks to ROE could reduce their credit expansion. If foreign banks stop lending, the net international reserves-to-GDP ratio could fall by 36 percent, assuming that all additional credit is funded from abroad. However, the macroeconomic effects of slower credit growth are difficult to model, as they depend on a number of factors, such as the source of the shock, country risk, size of exposure to a country, and banks' long-term strategic objectives in the region. Furthermore, as it is impossible to estimate the probability or size of these shocks with any degree of precision, close surveillance of these risks is essential.

V. MITIGATING FACTORS RELATED TO EU INTEGRATION

33. **Deepening EU integration increases the ability to carry vulnerabilities in emerging Europe compared to other emerging markets.** European integration has lowered barriers to capital and trade and political risks, leading to deeper integration within the region. This has contributed to a natural dispersion in current account balances, with some countries running relatively large deficits. The deficits, and related capital inflows, are thus part of an equilibrium catch-up of incomes in emerging Europe, catalyzed and sustained by the integration process. This is likely to continue, especially in cases where initial per capita incomes have been low (Schadler and others, 2006; and Abiad and others, 2007). Rapid credit growth, in this context, would also reflect a shift to a new equilibrium as part of a permanent deepening of the financial system and an improvement of investment opportunities. Calculations of ratios of credit to private sector to GDP show indeed that in most of SEE they are still below estimated equilibrium levels. However, these models capture only domestic credit, and adding direct credit from abroad and intercompany loans increases substantially the broader credit-to-GDP ratios in SEE (see chart).

Foreign bank credit to SEE companies is an important complement to domestic credit.



Source: Eurostat; ECB; Country Authorities; and IM

Nongovernment Credit to GDP Ratios (In percent)

	2005			2006		
	Actual	Predicted 1/	Deviation 2/	Actual	Predicted 1/	Deviation 2/
Bulgaria	42.5	55.0	-12.5	46.3	57.8	-11.5
Croatia	62.9	64.4	-1.5	71.5	68.2	3.2
Romania	21.1	41.7	-20.6	27.2	52.4	-25.2
Serbia	27.9	41.6	-13.7	27.1	33.9	-6.8

Sources: IFS, EMED, DX data bases; Schadler, Drummond, Kuijs, Murgasova, and van Elkan (2005); and IMF staff calculations.
1/ Equilibrium value predicted based on estimates of the long-term cointegrating relationship.
2/ Deviation of the actual from the predicted level.

34. **EU integration mitigates vulnerabilities by contributing to:**

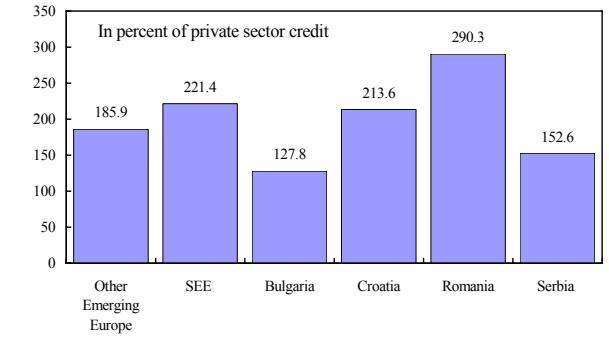
- **Sustained sound macroeconomic policies, strong bank supervision, and better business environments.** As a result, EU integration would have helped emerging Europe cross nonlinearities in the growth process arising from technological or institutional thresholds, which have been found in empirical studies to enhance sustainability of growth with high reliance on foreign savings (Kose and others, 2006). The stronger institutions, greater transparency, and better policies would have facilitated an efficient allocation of capital in emerging Europe, which enables sustainable growth with large external imbalances.

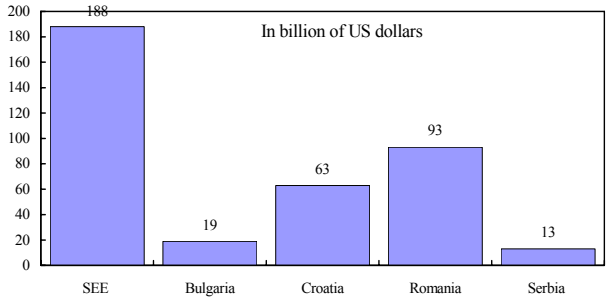
- **Deeper cross-border integration and diversification.** The integration of emerging Europe to continental financial networks has diversified risk, which increases these countries' ability to carry debt. A loan by a local entity from a large foreign bank with broad exposures would thus be less risky than the same loan from a domestic bank. The diversification

process has been reinforced by financial innovation in increasingly globalized financial markets, that disperse risk to a rising number of participants. Deepening trade integration and expectations of euro adoption, in turn, are generating higher growth prospects, which will help sustain large deficits and debt. Many investors may also believe that the EU can provide an implicit bailout guarantee should something go wrong in the new members.

- **Strong presence of foreign banks in the region.** EU integration and transition reforms have brought Western European banks to emerging Europe. They now account for the majority of domestic bank assets in much of the region and are the main providers of direct foreign loans to enterprises and banks. Their strong presence has improved bank efficiency and allocation of the capital inflows by transfer of modern risk and other management techniques. Furthermore, the banks' long-term view of the region, reputational risks, and strong links to parent banks are thought to reduce the likelihood of distress and sudden stop risks.

Foreign Bank Participation in SEE Countries, End-December 2006 1/





Sources: BIS; and IFS.

35. **This benign view has been shared by markets.** This is indicated, for example, by spreads that in emerging Europe (except Serbia) have been much narrower than in other emerging markets with similar fundamentals (Luengnaruemitchai and Schadler, 2007). This "EU halo effect" would be explained by the benign impact of EU integration, including expectations of potential bail-outs, on reducing risks in emerging Europe.

36. **However, these mitigating factors are weaker in SEE than elsewhere in emerging Europe.** Despite progress with EU integration, institutional and legal frameworks in SEE remain weaker than in other emerging European countries, as indicated by studies on corruption, business environments, or progress in transition. In particular, the corruption perception index and World Bank's Doing Business indices rank SEE substantially worse than other emerging Europe countries. These indicators for SEE are also lower than those in pre-crisis Asia. This points to potential weaknesses in allocating resources effectively, and that the speed of credit growth may have overstretched the banks' and supervisors' credit assessment capacity, affecting credit quality. As discussed above, this is exacerbated by poor data on creditworthiness and economic developments. Therefore, the risk of extending credits to subprime borrowers, as was recently done in the US mortgage markets, is high in SEE. These factors weaken some of the assumed beneficial effects from stronger institutions and the presence of foreign banks. Therefore,

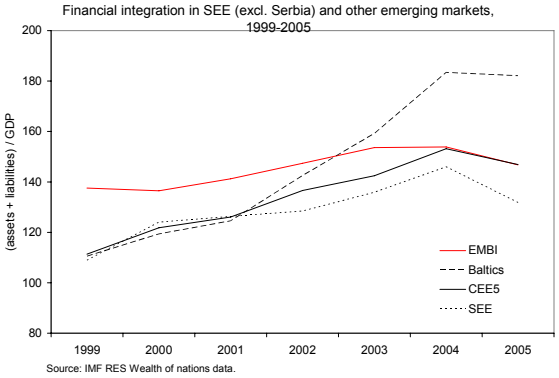
SEE, CEE5, and Baltics - Institutional Indicators

	Financial Sector Reform 1/ Scale: 0-4.33	Corruption Perceptions 2/ Rank out of 163	Ease of Doing Business 3/ Rank out of 175
SEE	2.9	75	85
CEE5	3.6	45	58
Baltics	3.5	40	19

1/ EBRD, 2006. Average of "banking reform and price liberalization" and "securities markets and non-bank financial institutions."
2/ Transparency International, 2006.
3/ World Bank Doing Business, 2006.

the mitigating factors might be less applicable to SEE than to other emerging Europe, reducing the region's ability to carry large imbalances.

37. **The benefits from risk diversification may also be weakened in SEE by the dominance of inflows from a few banks and higher-than-expected correlation of risks.** The dependence on a small number of foreign banks from a few countries is relatively large. Claims to the largest two creditor countries were over half in SEE compared to a third of total in CEE5,[15] and total foreign bank claims, either from branches and subsidiaries, or directly from the parent bank, were 221 percent of private sector credit in 2006 in SEE compared to 180 percent in other emerging Europe (excluding FDI). This increases contagion risks, which can result in sudden stops despite reputational risks and longer-term commitments to the region. Part of the inflows may also reflect excess liquidity in world capital markets in search for a higher yield, rather than EU specific factors, implying that a sudden change in market sentiment can affect the inflows more than expected. Measured by the share of the assets and liabilities in GDP, financial integration in emerging Europe, apart from the Baltics, has not differed substantially from other emerging markets.



38. **As discussed above, the reliance on a few foreign banks and liability euroization may also have introduced new sources of risk that weaken the mitigating factors in SEE.** Asymmetric exposures of large banks in small markets, biased incentive structures for short-term profit, centralized risk management practices in large conglomerates, and concentration of funding sources can lead to an underestimation of risk in the region, adding to vulnerabilities. Financial euroization has also amplified indirect credit risks, given the large exposure of nontradable sectors to foreign currency loans.

VI. What Should Policymakers Do About the Vulnerabilities in Emerging SEE to Ensure Sustainable Convergence?

39. **Vulnerabilities seem significant in SEE even if one considers the mitigating factors.** The underlying external vulnerabilities—large current account deficits and high external debt—are considerable and mostly rising, and in many ways resemble those before previous emerging market crises. External vulnerabilities in SEE are also larger than in other emerging market countries, except in the Baltics. Moreover, the large balance sheet mismatches in SEE, together with the pattern of catch-up, aggravate the vulnerabilities. Empirical work also suggests that the probability of a sudden stop is elevated and rising in parts of SEE, and that related potential output losses can be important. In addition, given foreign banks' heavy presence in SEE, the impact of regional shocks on host country financial sectors can be significant. While mitigating factors related to EU integration reduce these risks somewhat, the vulnerabilities in SEE cannot grow limitlessly, and the

[15] The Baltics have 70 percent of all claims with one country—Sweden.

region is susceptible to a sudden turn in the world economy or other trigger that can force large adjustments or prolonged slow growth.

40. **A policy response is therefore warranted.** As it remains difficult to distinguish in practice when vulnerabilities such as strong credit growth or large current account deficits are part of sustainable equilibrium processes or risks to stability, it is prudent to undertake policy measures to insure against this risk. This may call for trade-offs between faster growth and risks of costly reversals of capital inflows. Getting the balance right can be difficult. Thus, the challenge is to identify policies that mitigate vulnerabilities, while minimizing the collateral damage to growth, including through the creation of new distortions. In part, the policy response will depend on the authorities' appetite for risk, and their willingness to pay for "insurance" by implementing appropriate policies that may imply lower growth. Apart from sound macroeconomic management, policies should be guided by the reduction or elimination of distortions that create the vulnerabilities, as argued by Blanchard (2007).

A. Prudent Macroeconomic Policies Will Remain Key to Continued Stability

41. **Strong macroeconomic discipline continues to be needed to ensure stability and contain vulnerabilities.** Signs of overheating, wage and demand pressures, and policy loosening have emerged in SEE that could worsen the vulnerabilities. For example, all countries plan to loosen fiscal policy in 2007, and important wage pressures are present in Bulgaria, Romania and Serbia. The inflows of EU funds can further add to these trends (Rosenberg and Sierhej, 2007). Questions are also being raised about the risks of overvaluation for some of the currencies, although the evidence is mixed. Mindful of the constraints discussed above and country specific differences in policy frameworks and stances, policymakers should consider the following actions:

- **Avoid procyclical fiscal policies and remove incentives to borrow**. This will continue to be countries' main line of defense to contain demand, given the prevailing monetary frameworks, although evidence that fiscal policy has a large impact on the trade balance is scant at best.[16] There appears to be room for fiscal tightening, especially in Croatia and Serbia, while EU accession-related flows in 2007 make this more difficult in Bulgaria and Romania. In some cases, fiscal incentives for certain types of borrowing (such as interest deductibility for mortgage loans) should be eliminated. Sectoral targeting of the EU funds from construction to human capital development can also reduce overheating pressures.

- **Contain growth in bank credit with tight monetary policies**. Where a certain degree of monetary policy independence exists, central banks can raise interest rates, although such a policy may promote a greater shift to foreign currency-denominated loans or attract more inflows, thereby raising calls for sterilization. Other options might include raising required reserves or broadening the reservable base, perhaps targeting banks' foreign currency borrowing, as in Croatia and Serbia, or real estate loans, as in Latvia, although the efficacy of such measures remains in doubt.

[16] A possible reason for this is that fiscal consolidation may crowd in private borrowing and investment.

- **Stockpile international reserves**. Reserve accumulation is a way of buying insurance against crisis and is facilitated by currency appreciation pressures in SEE.[17] High levels of reserves can not only smooth domestic absorption during financial account reversals but can also reduce the likelihood of crisis, including by discouraging speculation against the domestic currency and facilitating the rollover of residents' foreign currency debt. The downside of reserve accumulation is the opportunity cost of holding reserves, usually measured as the difference between the return on the reserves and the return on more profitable alternative investment opportunities (which might include paying down public debt), as well as sterilization costs (Hauner 2005). There are no hard-and-fast rules on what is an optimal level of reserves. The Greenspan-Guidotti rule suggests that reserves should cover short-term debt, but this rule lacks fully developed analytical foundations. Calvo (2006) advocates M2 cover for reserves to ensure that banks deposit can be insured. Jeanne and Rancière (2006) provide an analytical framework for assessing the optimal reserve level, but their approach, in turn, does not yield an easy-to-use rule.[18]

42. **SEE should also continue implementing structural reforms.** As noted by Herzberg and Watson (2007), the lag in structural reforms and institutional deepening in SEE could result in a lack of high-return investments. To reduce the institutional weaknesses discussed above, reforms that address rigidities in business environments, legal systems, privatization (in some countries), and labor markets should be invigorated. This would improve allocation of resources and productivity, thereby alleviating pressures on competitiveness and potential exchange rate overvaluation. This would also improve the region's ability to adjust to potential shocks.

43. **Although the appropriateness of the existing exchange rate regimes in the face of large capital inflows is a difficult question for SEE policymakers, it merits discussion.** Fixed exchange rates have been one of the causes in many emerging market financial crises. The existing monetary frameworks and open capital accounts may also have contributed to the buildup of vulnerabilities. The currency board in Bulgaria and the heavily managed float in Croatia largely subject the economies to euro interest rates that have been too low for their cyclical conditions. This situation may have exacerbated credit growth. The fixed currency regimes may also have desensitized economic agents and authorities to exchange rate risk, as indicated by the currency mismatches—the largest in the region—and led to underpricing of currency risk. Together with expectations of real appreciation as incomes converge to EU levels, this may have contributed to the large foreign currency liabilities in the nontradables sectors. With open capital accounts, higher interest rates in Romania and Serbia, combined with these countries' flexible exchange rate regimes, have attracted additional capital inflows, which, in turn, required sterilization to contain their demand impact. These factors show the constraints on macroeconomic policies from open

[17] As is well known, many emerging markets particularly in Asia have built up large amounts of reserves. Durdu, Mendoza, and Terrones (2007) find that financial globalization and sudden stop risks cause large permanent increases in foreign assets. A large part of existing reserves are also deposits by banks (reserve requirements) and may be withdrawn if economic conditions change.

[18] This study's key finding is that Asia's emerging markets have accumulated reserves in excess of what would be implied by an insurance motive against sudden stops.

capital accounts in dealing with capital inflows even with flexible exchange rates when cycles across countries differ.[19]

44. **In particular, the pros and cons of greater exchange rate flexibility in SEE merit debate.** More exchange rate volatility could induce agents to better price market risks and reduce currency mismatches on their balance sheets. For example, in Hungary currency mismatches abated substantially after the forint weakened in 2006. Flexible rates could also dampen overheating pressures, if they entail appreciating currencies. However, this may be less clear if wealth and income effects from the large holdings of euroized liabilities are taken into account. Exchange rate appreciation could also further widen current account deficits, lead to additional inflows into the nontradables sector based on higher expected profits, and increase the temptation to assume risky foreign exchange exposures. If interest rates were raised as part of this strategy, further capital inflows could follow. A devaluation could affect pricing of currency risk, reduce mismatches, and shift resources into tradables, but its impact on the vulnerabilities would, in turn, depend on wealth and income effects and other factors discussed above. Given their euro adoption aspirations and the uncertainties from any regime change, policymakers in Bulgaria and Croatia are likely to be more inclined to maintain their current regimes. However, it is useful to discuss various options in SEE because, if vulnerabilities worsen, the markets may force disruptive changes in the regimes.

B. Stronger Financial Sector Policies Are Needed to Reduce Distortions That Can Drive the Vulnerabilities

45. **The buildup of vulnerabilities is likely to have been exacerbated by distortions in risk pricing and shortcomings in supervisory practices and other "sectoral policies."** In theory, the SEE risk premium should rise in response to high vulnerabilities, creating a market-based adjustment in the inflows and current account deficits to more sustainable levels. While the EU effect may explain part of the lower-than-expected risk premium, markets may be underpricing risks as discussed above.

46. **While the external distortions may decline over time because of market developments, domestic distortions can be addressed by policy measures.** The *external sources of risk mispricing* may correct themselves automatically, if changes in world market conditions modify risk perceptions of foreign investors and creditors. Indeed, the August 2007 turmoil in the financial markets already led to a re-pricing of risk, including in emerging markets. The recent increases in euro interest rates may slow inflows to emerging markets and increase the cost of credit in SEE. These developments could contain domestic demand, which can be further reinforced if rising

[19] Capital controls could reduce inflows and improve monetary policy effectiveness, but they are generally not recommended as they are unlikely to be effective. This is borne out by the experiences of several European emerging market economies surveyed in Ötker-Robe and others (2007), who find that as countries become more integrated with international financial markets, there is little room to regulate capital flows effectively. Their impact on demand of any resulting wedge between domestic and foreign interest rates may be undermined by the high degree of euroization. Furthermore, Bulgaria and Romania, as members of the EU, could avail themselves of this option only under limited circumstances. In any event, the consensus view appears to be that priced-based capital controls are not useful, as they are effective only in the short run, lead to numerous distortions, and create strong incentives to circumvent the regulations.

indebtedness in the corporate, and to some extent the household, sectors, raises risk premia, and if a less benign world environment lowers expectations about permanent incomes. This leaves *domestic distortions* as one main area for further policy focus. Although their impact remains uncertain, the following actions are worth considering to reduce vulnerabilities in SEE:

- **Tighten financial supervision at home**. Although much has been done in recent years to strengthen supervision in SEE, the distortions in risk pricing, balance sheet mismatches, and difficulties in controlling credit growth emphasize the importance of even stronger supervision. More needs to be done to improve credit quality, thereby also enhancing banks' shock absorption capacity.[20] This can involve raising minimum capital adequacy requirements, increasing the risk weighting of certain types of credit (for example, mortgages, or credit denominated in foreign currency—even in Bulgaria), tightening provisioning rules, and reducing (or introducing) maximum loan-to-value and debt service-to-income ratios (Hilbers and others 2005). However, more pertinent given this paper's finding on balance sheet mismatches is strengthening the ability of banks and supervisors to better assess and manage banks' indirect exposure to currency risks, including through improved disclosure rules, required periodic surveys of banks' and their borrowers' currency exposures, more frequent on-site inspections and stress tests, and closer monitoring of loan indexation clauses.

- **Strengthen cross-border supervisory coordination.** To better understand the risks and vulnerabilities created by the activities of international banks, SEE supervisors should strengthen their dialogue with home and possibly other host country authorities of foreign banks. As much of private credit in SEE is direct borrowing from abroad, which bypasses local supervision, the importance of cooperation with foreign supervisors is further reinforced. Greater home-host supervisory cooperation is needed to bridge the different risk perceptions between them—especially when foreign operations are systemically important to the host country—to ensure that parent banks are adequately managing risks in their foreign subsidiaries. It is important to increase the awareness of home-country supervisors to potential risks in host countries. Furthermore, problems in one host country can have regional repercussions especially in view of the concentration of regional exposures in a few banks and countries.

- **Avoid moral hazard.** To ensure that risks are priced appropriately, policy makers should not give signals that raise expectations of public bailouts.

- **Develop capital markets**. Equity markets could be strengthened by easing listing requirements and linking stock exchanges to European networks. This should reduce leverage by improving access to equity. The development of deeper and more liquid government and corporate bond markets—in local currencies and with longer maturities—is

[20] At the margin, by making lending decisions more expensive, supervisory policies may be able to influence the quantity of credit, but this would not in general be such policies' main objective.

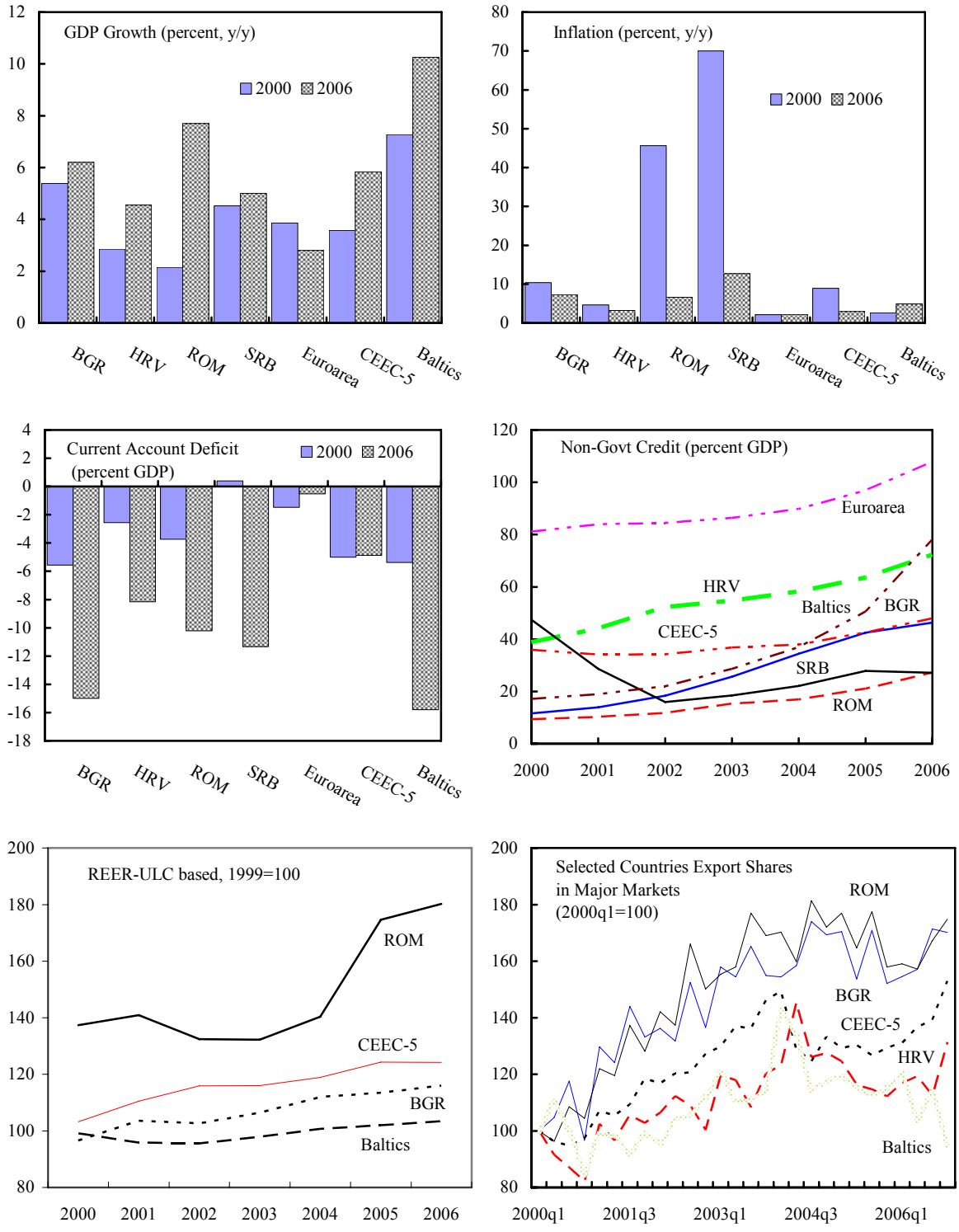
another area in which currency risks can be reduced by overcoming "original sin".[21] In addition, development of financial derivatives to hedge currency risk would likely come naturally with the establishment of local bond markets, as foreign investors might be interested in raising capital in local currencies. To deal with problems of efficiency and scale, given the small size of local capital markets, SEE should take advantage of possibilities offered by EU financial integration. Finally, developing a local institutional investor base could also prove helpful.

- **Targeted sectoral policies**. For instance, where there are signs of real estate bubbles, taxation of real estate transactions can be introduced (or existing rates raised); also, perhaps, zoning laws can be liberalized to allow more supply of housing.

- **Improving vulnerability assessments with better data**. The diagnosis of vulnerabilities would be well served by better data, particularly on household and corporate sector balance sheets and more disaggregated and timely capital flow data (including its sectoral uses, consumption versus investment, and tradables vs. nontradables). Better data can contribute to more realistic risk assessments.

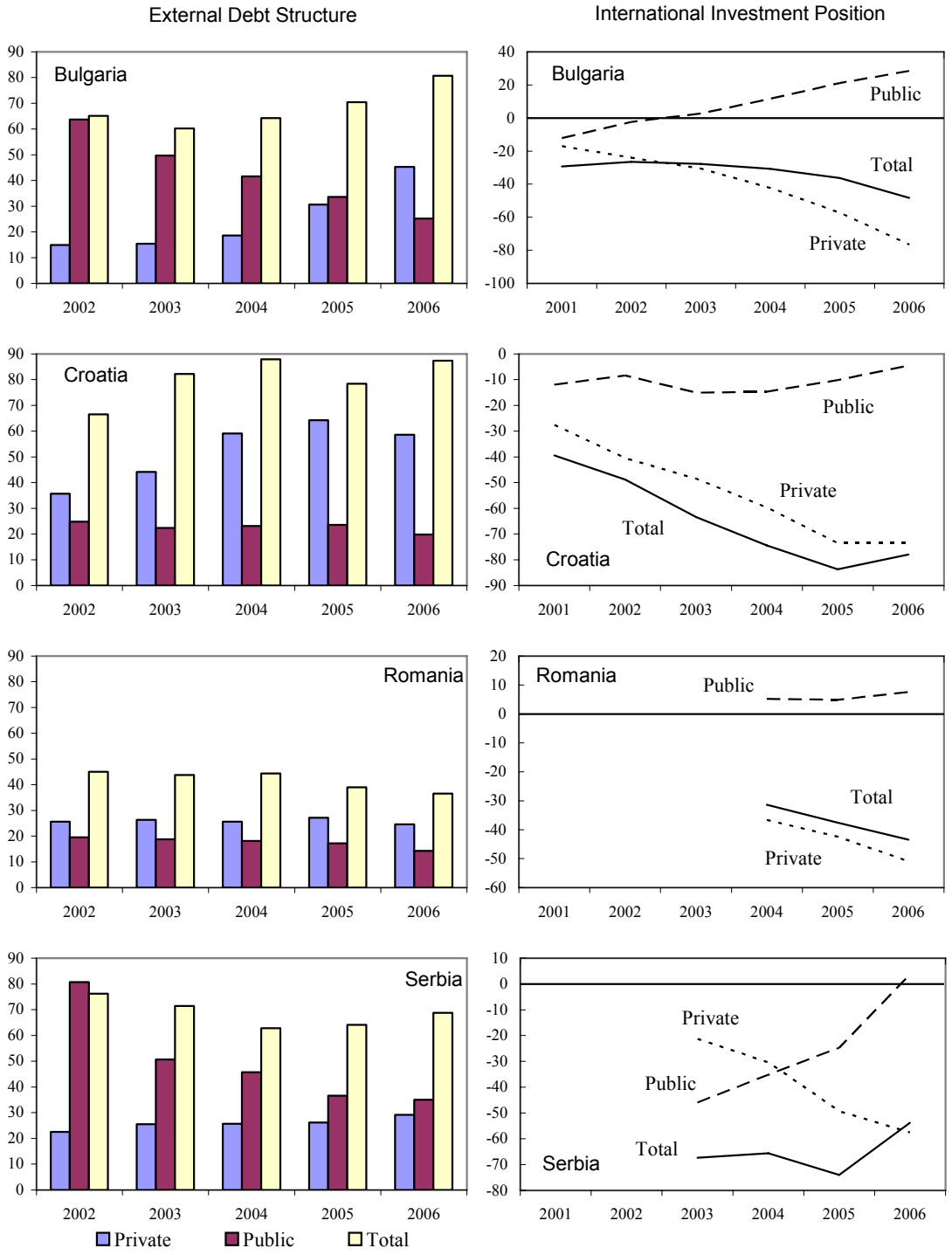
[21] Goldstein and Turner (2004) point out that financial development has reduced currency mismatching in some countries, but significant differences remain among emerging markets in their capacity to hedge currency risk. Local currency capital market development is also likely to help reduce vulnerabilities in the medium term, but it is no panacea. Indeed, in times of turmoil, foreign participation in local currency financial markets can produce pressures in both the local capital and currency markets.

Figure 1. SEE Countries: Key Indicators, 2000-06



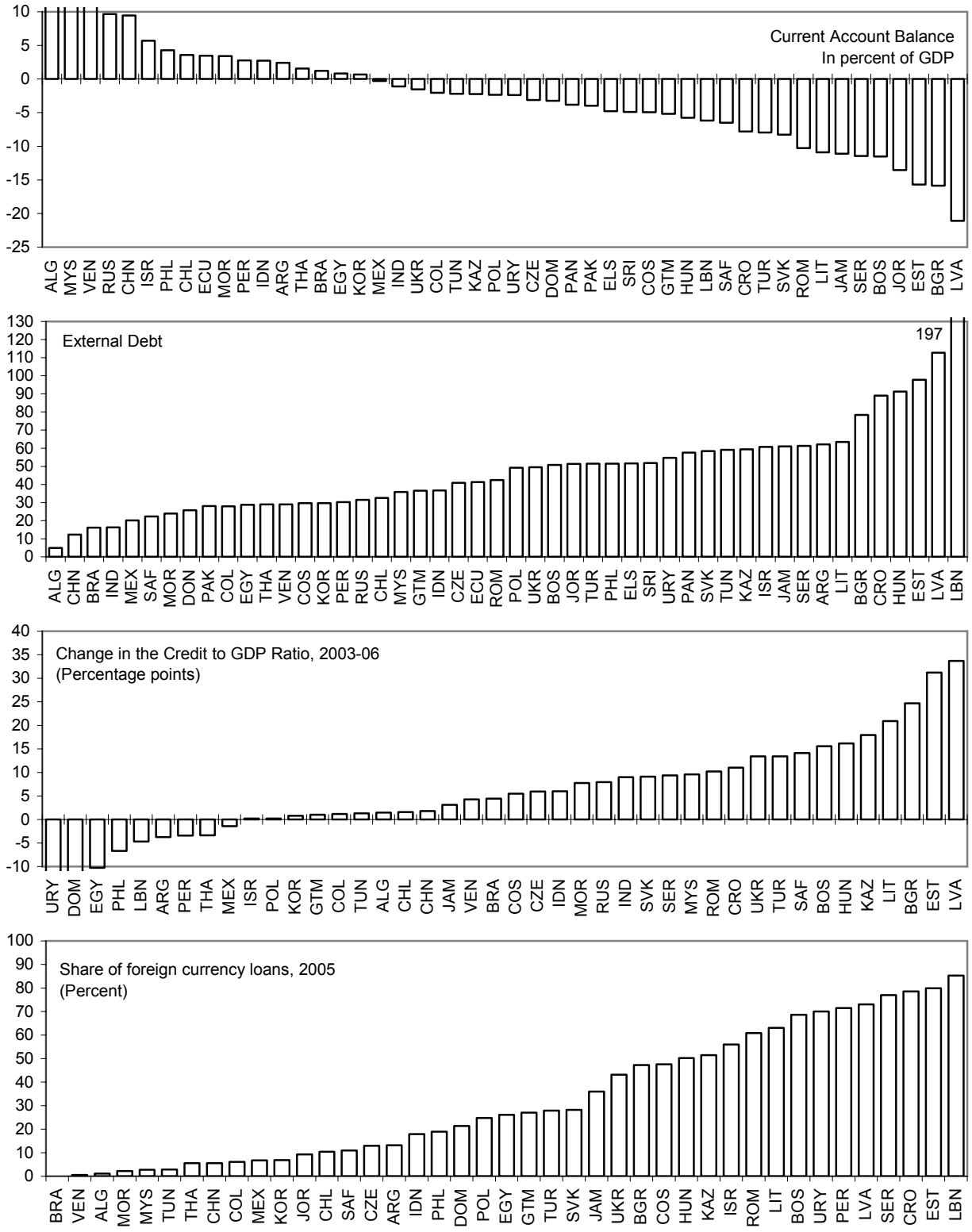
Source: IMF DOT; and IMF Staff calculations.

Figure 2. SEE: Structure of External Debt and Net Foreign Liabilities, 2002-06
(Percent of GDP)



Source: PDR vulnerability database, staff estimates.

Figure 3. Emerging Market Vulnerability Indicators
(2006 or as indicated)



Source: IMF, Vulnerability Database

Figure 4. Bulgaria: Sectoral Distribution of Corporate Foreign Currency Liabilities

Source: BNB

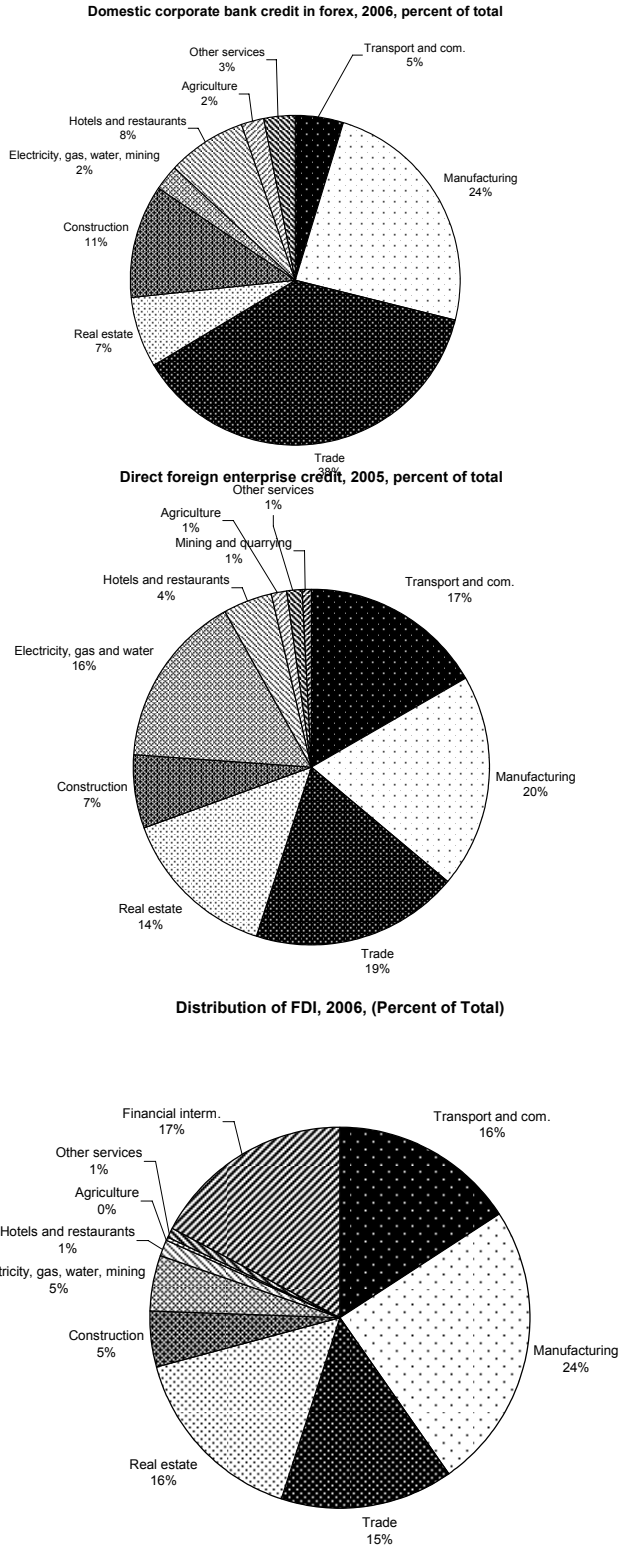
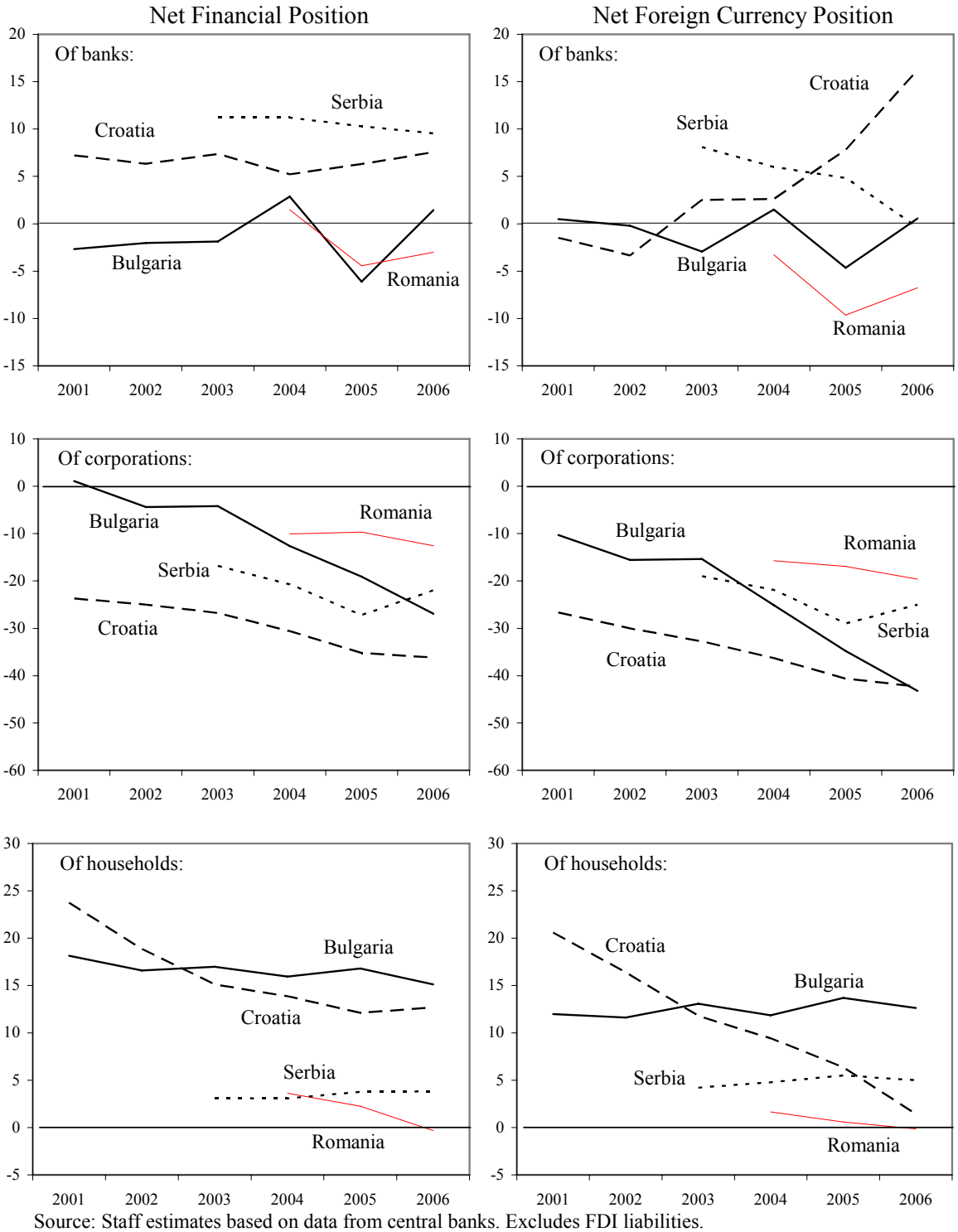


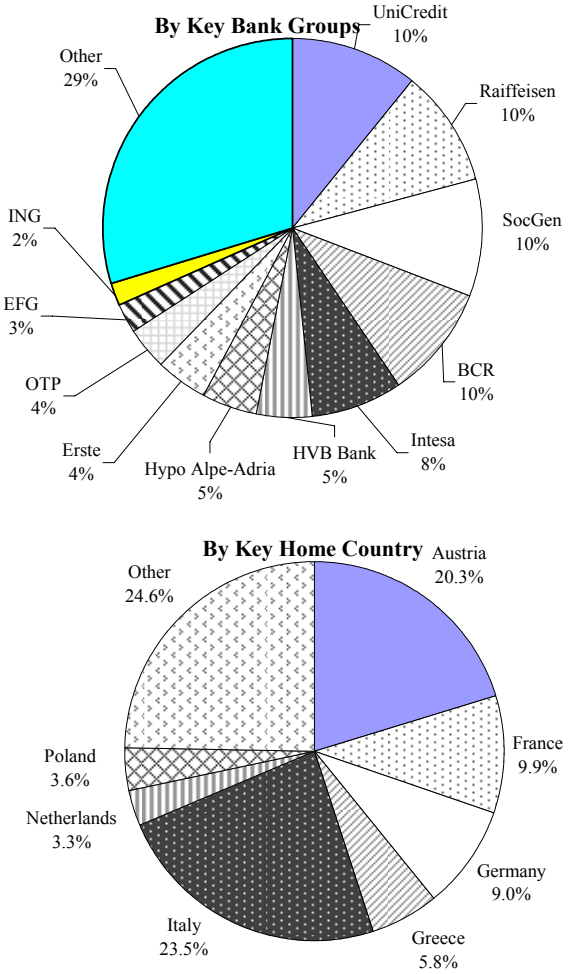
Figure 5. SEE: Total and Foreign Currency Net Liabilities of the Main Sectors, 2001-06
(Percent of GDP)



Source: Staff estimates based on data from central banks. Excludes FDI liabilities.

Figure 6. SEE Bank Asset Structure, by Bank Groups and Creditor Countries, end-March 2006

(in percent of total foreign bank claims to SEE countries)



Source: RZB Group (2006); Bank for International Settlements (BIS); and staff estimates.

APPENDIX

I. Estimating the Output Consequences and Probability of a Sudden Stop

A. Nontechnical Summary

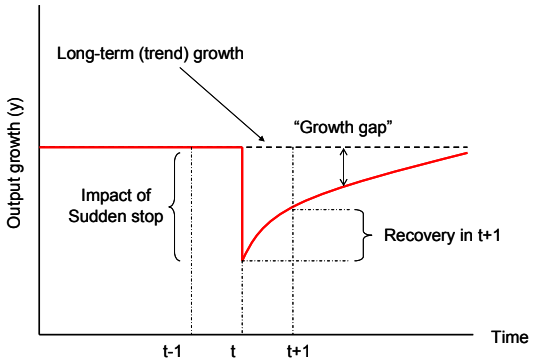
The empirical model seeks to gauge the likelihood and impact of a hypothetical stop in capital flows based on the experience of other emerging and industrialized countries. The model focuses explicitly on the features of the SEE region that make it vulnerable to a sudden stop and provides a quantitative answer to the following two questions: (i) to what extent have these vulnerabilities increased the risk of a sudden stop, and (ii) in the event of a sudden stop, to what extent will these vulnerabilities exacerbate the associated drop in output?

Drawing on the approach of Calvo (2004), Edwards (2004), and others, the likelihood of a crisis depends mainly on the following factors: (i) the size of the current account deficit relative to the tradables sector; and (ii) the extent of domestic liability dollarization (*DLD*). As both of these vulnerabilities increase, we would expect the probability of a crisis to rise. In addition to these two factors, we also control for (iii) the extent of FDI inflows.[22] Allowing for the possibility that not all investors are the same, we might expect that FDI inflows reflect a more strategic, long-term perspective, and that they may be less likely to dry up in the event of a local or global shock. So an increase in FDI flows may be associated with a lower probability of a sudden stop. In short, therefore, we have

$$\text{Prob. of Sudden Stop} = f\left(CAD/Tradables, DLD, FDI\right).$$

In the event of a sudden stop, the model then estimates the impact on output growth. This is modeled within an error-correction framework in which the *change* in a country's growth rate depends on (i) the distance between the current growth rate and the country's estimated long-term growth rate, that is, the "growth gap;" and (ii) the presence of a sudden stop. The model also controls for (iii) changes in that country's terms of trade.

A sudden stop is expected to result in a sharp and immediate drop in output growth. Over time, however, the growth should eventually return to trend. The model also includes an interaction term, which allows for the possibility that countries with a greater degree of external vulnerability may experience a more painful drop in output, or a less rapid return to trend.



B. The Model

To assess the implications of a sudden stop, we need a framework that estimates both the determinants and consequences of a capital account reversal. In this context, we employ a "treatment effects model", which is more typical of the medical literature, but has also been employed by economists such as Edwards (2004) in the study of current account reversals. The model includes both a specification that outlines the impact of a sudden stop on growth (the

[22] For our purposes, we exclude debt-creating FDI flows.

"outcome"), as well as a specification outlining the determinants of that sudden stop (the "treatment"). These are estimated jointly within a single framework. More specifically, we start with

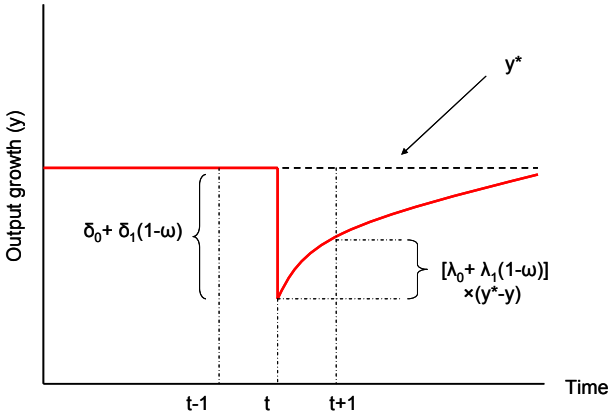
$$y_i^* = \alpha + X_i\beta + r_i\gamma + \varepsilon_i . \qquad (1)$$

Equation (1) is a long-run growth equation: y^* is long-run real per capita growth in country i; X_i is a vector of covariates that capture the traditional determinants of growth[23]; r_i are regional dummies; and ε is an error term. Equation (2), the "outcome," is a growth dynamics equation:

$$\begin{aligned}\Delta y_{it} = {} & \lambda_0(y_i^* - y_{it-1}) + \lambda_1\left[(y_i^* - y_{it-1})\times(1-\omega)_{it-1}\right] \\ & + \delta_0 z_{it} + \delta_1\left[z_{it}\times(1-\omega)_{it-1}\right] + \theta W_{it} + \left(\mu_i + u_{it}\right)\end{aligned} \qquad (2)$$

where $(y_i^* - y_{it-1})$ is an error-correction term that measures the gap between the long-run growth rate and the current actual growth rate (the "growth gap"); W_{it} is a terms of trade shock; and z_{it} is a dummy variable that takes a value of 1 if country i in period t experiences a sudden stop. So, δ_0 measures the basic impact of a sudden stop on growth. As outlined in Calvo (2004), $(1-\omega)$ is a measure of the current account deficit relative to the domestic consumption of the tradables sector, where ω is then the fraction of tradables consumption financed domestically. The term $\left[z_{it}\times(1-\omega)_{it-1}\right]$ is an interaction term that measures whether the impact of a sudden stop worsens with a country's external vulnerability. A similar interaction term is included for the growth gap. Finally, μ_i is a country-specific fixed effect, and u_{it} is an error term. The impact of a sudden stop and the reversion of the growth rate to its long-run value is illustrated below in Figure 1.

Figure 1: Impact of a Sudden Stop on Growth[24]



The determinants of a sudden stop (the "treatment") are modeled within a random-effects probit framework, in which the occurrence of a stop is assumed to be the result of an unobserved latent variable, z_{it}^* in equation (3). The latent variable, in turn, is assumed to depend on a vector of covariates S_{it}, as in equation (4)—and in our model, S_{it} simply consists of our two indicators of internal and external vulnerability (*DLD* and $(1-\omega)$),as well as the ratio of net FDI inflows to

[23] Equation (1) follows the now standard literature on growth, as outlined in Barro and Sala-I-Martin (1995). The regression is run using long-run averages, and the covariates in X_i include the log of initial GDP per capita; the investment ratio; the degree of openness in the economy (i.e, exports plus imports as a proportion of GDP); and the ratio of government consumption to GDP.

[24] This figure maps the labels from the figure in section A to the mathematical terms used in this section.

GDP: $z_{it} = \begin{cases} 1, \text{if } z_{it}^* > 0 \\ 0, \text{otherwise} \end{cases}$, (3)

Where $z_{it}^* = S_{it-1}\phi + \zeta_{it}$. (4)

The variable ζ_{it} is the error term of the probit framework and is determined jointly with u_{it} within a mean-zero bivariate normal distribution:

$$\begin{pmatrix} u \\ \zeta \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma & \rho \\ \rho & 1 \end{pmatrix}\right).$$

The model, then, is estimated by a two-step procedure. In the first step, equation (1) is estimated to give each country's long-term growth rate, y_i^*. This estimate is then used to calculate the growth gap $\left(y_i^* - y_{it-1}\right)$ for each country in equation (2). Given that there may be nonmodeled phenomena that could both increase the probability of a sudden stop as well as depress growth—perhaps movements in global attitudes toward risk that also affect domestic confidence—estimating equation (2) alone by least squares might overestimate the treatment effect (i.e., the impact of a sudden stop). So equation (2) is estimated jointly with the probit model outlined by equations (3) and (4), via maximum likelihood.

C. The Data

The data set consists of a yearly panel of 32 emerging and industrialized countries for the period 1990-2002:

- Our indicator of external vulnerability $(1-\omega)$ measures the current account deficit as a proportion of the domestic absorption of tradables (*Z*). Our proxy for *Z* is constructed by using the sum of agricultural and industrial output as a measure of the supply of tradables, and then subtracting exports and adding imports to get a measure of final absorption. All data for this indicator, as well as all growth-related covariates in equation (1) and values for FDI/GDP are from the World Bank's *World Development Indicators* database.

- The indicator for internal vulnerability is a measure of domestic liability dollarization (*DLD*). Where available, this is defined as BIS reporting banks' local asset positions in foreign currency as a proportion of GDP. For many emerging market countries, however, BIS banking data are unavailable, so we build an estimate by summing the foreign currency deposits and net foreign liabilities of the banking sector. Under the assumption that banks match their foreign currency assets and liabilities, this should be an adequate proxy for foreign currency lending to the domestic nonbank sector (*IFS* database).

- The dummy variable data identifying instances of a sudden stop are taken from Calvo and others (2004). These authors identify episodes of *large* and *unexpected* falls in capital inflows using monthly data from the *IFS*. As capital flow figures are generally unavailable on a monthly basis, they construct a proxy by netting out the trade balance from changes in foreign reserves. Sudden stops, then, are defined as episodes in which the year-on-year drop in capital flows falls at least two standard deviations below the (rolling) sample mean, where the drop is also associated with a contemporaneous fall in output growth.

D. Results

The results of the estimation are shown in Table A.1 below. Turning first to the probit estimates presented in Panel B of the table, both vulnerability indicators have the expected sign and are significant; i.e. an increase in a country's CAD, relative to its tradable sector, will tend to raise the probability that the country will face a sudden stop in capital flows, as will an increase in the amount of foreign-currency lending to the non-bank sector. The presence of FDI as a source of inflows, however, is a key mitigating factor. While the out-of-sample use of the regression to provide precise probability estimates for SEE countries is subject to the usual caveats, the message from the table is clear—running a large and increasing current account deficit will tend to increase the risk of a sudden stop, and is particularly dangerous in the context of widespread domestic balance-sheet mismatches.

Turning to the outcome-equation estimate in Panel A, again all coefficients are significant and have the expected sign. A sudden stop in capital flows will lead to a drop in GDP growth, and this will tend to be worse for countries with higher current-account deficits. Moreover, although growth will tend to return to its long-run value over time, this process will tend to be slightly slower for countries with higher deficits. From the results, the impact of a sudden stop is

$$\text{growth effect of reversal} = -4.265 - 16.970 \times (1 - \omega)$$

Applying these results to SEE countries, a sudden stop in capital flows will likely cut the growth rate by about 7½-8½ percentage points, with some recovery of the growth rate to be expected in the first year after the crisis.[25]

[25] Although countries with higher deficits will tend to return to the long-run rate at a slower pace, this is not immediately apparent from the table, as countries with higher deficits will tend to have a larger initial shock and so will tend to be further from their long-run rate. Given the error-correction specification, this latter aspect will tend to offset the lower coefficient.

Table A.1. Sudden Stops, Growth, and Openness. Treatment Effects Model

Variable	
A: Results from Growth Equation (Outcome)	
θ: Change in TOT	0.080
	[2.09]**
δ_0: Sudden Stop	-4.265
	[-3.11]***
δ_1: Sudden Stop ×	-16.970
$(1-\omega)_{t-1}$	[-2.12]**
λ_0: Growth Gap	0.734
	[11.95]***
λ_1: Growth Gap ×	-0.969
$(1-\omega)_{t-1}$	[-2.83]***
Constant	1.085
	[2.12]**
B: Results from Sudden-Stop Equation ("Treatment")	
φ_0: $(1-\omega)_{t-1}$	3.780
	[3.13]***
φ_1: (Domestic Liability Dollarization)$_{t-1}$	3.211
	[2.43]**
φ_2: (Adjusted FDI inflows)$_{t-1}$	-0.133
	[-2.04]**
Constant	-1.200
	[-2.25]**
Rho:	0.249
	[1.55]
Sigma:	0.870
	[11.69]***
No. Obs.	304

t-statistics in brackets
* p<0.10, ** p<0.05, *** p<0.01

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