Republic of Serbia: Selected Issues

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INTERNATIONAL MONETARY FUND

REPUBLIC OF SERBIA

Selected Issues

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OVERVIEW

In 2006–07, the Serbian economy—boosted by large capital inflows and expansionary policies—continued to grow strongly, but external imbalances widened and vulnerabilities rose. This set of papers complements the staff report for the 2007 Article IV consultation by providing additional analytical coverage in several key areas, namely: (i) a detailed analysis of external, financial, corporate, and household sector vulnerabilities; (ii) an assessment of the real effective exchange rate; (iii) a quantitative estimate of the macroeconomic relationship between fiscal policy and the external current account; and (iv) an analysis of monetary policy under an inflation targeting framework.

Chapter I provides an overall assessment of Serbia's vulnerabilities. It documents how despite improvements in public sector finances, private sector vulnerabilities, notably external and financial, have increased in recent years, as reflected in rising current account deficits, private external debt, and credit euroization. While high official reserves mitigate external vulnerabilities to some extent, they are matched in part by contingent liabilities of the central banks toward commercial banks' required reserves. These findings suggest that a comprehensive approach, underpinned by structural reforms and strong fiscal and financial sector policies, is critical to reducing the growing imbalances.

Chapter II goes on to provide a more detailed analysis of corporate sector finances. While standard corporate balance sheet indicators appear to be broadly adequate, they mask the recent build-up of exposure to exchange rate, maturity, and rollover risks stemming from the surge in credit. These are revealed by examining debt flows and by stress tests on corporate sector balance sheets. Stronger structural policies, including privatization, would help alleviate vulnerabilities by raising productivity. Developing domestic capital markets would contribute to reducing rising euroization-related vulnerabilities.

Chapter III examines the rising household vulnerabilities. Consumer lending is still relatively low and buffers have been built through strict prudential and liquidity requirements. However, credit euroization represents a significant risk for usually unhedged household borrowers. The potential under-pricing of risk by foreign banks pursuing an aggressive strategy could lead to pressures on their balance sheets. Further risks stem from a sudden stop in capital flows, especially if tight global credit conditions persist. Preventing excessive risk buildup in household credits will require continued tight prudential and supervision policies.

Chapter IV lays out the assumptions made in the two CGER-type assessments of the level of the real effective exchange rate, found to be overvalued. The results are to be taken with caution given significant uncertainties in the calculations. The overvaluation reflects an unbalanced domestic policy mix. Rebalancing policies would involve accelerating structural reforms and tightening fiscal policy, which would make room for a less restrictive monetary policy.

Chapter V sets out to quantify the relationship between fiscal and current account balances—the so-called twin deficits. It finds that the fiscal stance has a significant impact on the current account in Serbia. This suggest that a policy of fiscal tightening could be expected to reduce the current account deficit in the short turn.

Chapter VI calibrates for Serbia a macroeconomic model regularly used by IMF staff—the Forecasting and Policy Analysis System. The model forecasts are compared with staff's baseline projections, and the model is used to assess the impact of various exogenous shocks on inflation, growth, and the exchange rate, given the endogenous reaction of monetary policy on interest rates. The model can serve as a policy making tool for the central bank in the context of a gradual adoption of formal inflation targeting.

Finally, Chapter VII estimates the fiscal impact of privatization, based on a sample of socially owned enterprises. It finds a positive and significant fiscal contribution in terms of increased tax and social security collections, reduced government subsidies and arrears to public utilities, and interest savings.

I. OVERVIEW OF VULNERABILITIES[1]

Objective: To provide an integrated assessment of Serbia's vulnerabilities.

Main findings: Despite improvements in public sector finances, external and financial vulnerabilities have increased in recent years, as reflected in the rapidly rising current account deficit, external debt, and highly euroized private credit. Moreover, the high official reserves may be only partly available to mitigate risks due to large short-term obligations of the central bank.

Policy implications: A comprehensive approach, underpinned by structural reforms and strong fiscal and financial sector policies, is critical to reduce the growing imbalances.

1.   **As most countries in Eastern Europe, Serbia started its transition with large investment needs and limited resources, implying high borrowing needs.** The resulting external deficits have been accumulated with the expectation that improved policies and structural reforms would spur economic activity and thus ensure medium-term sustainability.

Figure 1. Economy-Wide Vulnerability Indicators 1/
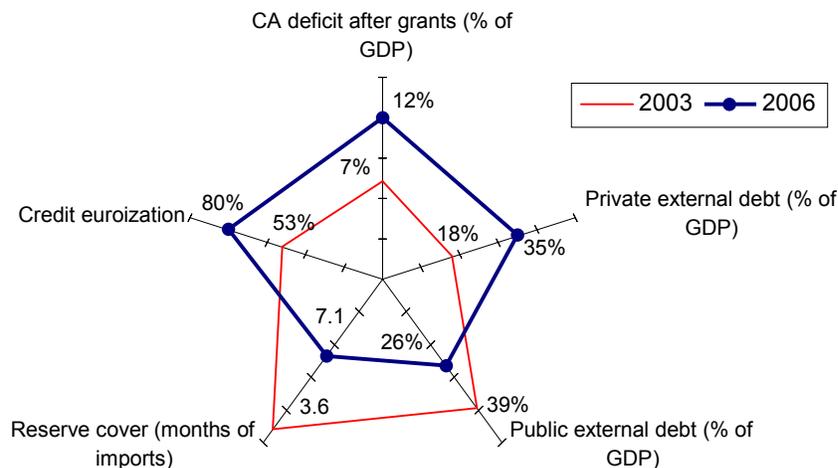
1/ Outward shift denotes worsening.

2.   **But several years into transition, economic policies seem to be lagging behind the growing imbalances, which has made the country more vulnerable (Figure 1).** In the public sector, one-off factors have improved finances and key indicators, although the

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[1] Prepared by Tokhir Mirzoev (EUR).

resurgence of fiscal deficits in 2006–07 is worrisome. These slippages combined with so far slow structural reforms and, consequently, a vulnerable corporate sector have raised private sector external vulnerabilities. The latter are reflected in the persistently rising current account deficits and private sector external indebtedness, against a backdrop of a small and poorly diversified export sector. Alongside, a combination of rapid growth of household credit, high euroization, and surging off-shore borrowing by enterprises has increased vulnerabilities in the financial sector. This chapter provides an overview of the key sectoral vulnerabilities.

A. Public Sector Vulnerabilities

3.   **Several one-off factors have reduced public sector vulnerabilities in recent years.** General government debt more than halved since 2002 due to Paris and London Club debt restructuring, strong fiscal performance in 2004–05 and large privatization-related receipts since 2005 (Table 1).

Table 1. Public Sector Vulnerability Indicators
(in percent of GDP, unless indicated otherwise)

	2002	2003	2004	2005	2006	2007 Proj.
Fiscal balance	-4.2	-3.0	0.0	0.7	-1.5	-1.0
primary balance	-3.7	-2.0	1.2	2.2	-0.1	-0.1
Consolidated public sector debt 1/	81.8	79.6	68.0	59.1	48.7	47.2
General government debt	77.4	74.7	63.1	54.1	39.6	37.6
of which foreign currency denominated	53.3	49.0	54.1	49.2	35.4	32.9
Gross official reserves 2/	14.4	15.4	17.3	22.3	37.4	34.2
In months of perspective imports	3.3	3.6	4.3	4.7	7.1	7.5
In billions of U.S. dollars	2.3	3.1	4.2	5.8	11.9	13.9
Memorandum items						
Stock of NBS securities (in RSD bn.) 1/	1.5	2.2	1.8	16.8	148.8	200.4
in percent of GDP	0.2	0.2	0.1	1.0	7.0	8.3
Privatization and license sales receipts	1.8	4.2	0.5	2.4	7.2	2.7

Sources: Serbian authorities and Staff estimates.

1/ Includes central bank obligations. The 2007 projection is based on the stock of NBS bills as of October 2007.

2/ As of end-October 2007.

4.   **Besides reducing the level of external public debt, these factors also improved its composition (Table 2).** At present, over 80 percent of external public debt is owed to non-private creditors, suggesting little rollover risks. Maturities are also favorable, as most loans are either medium- or long-term.

Table 2. External Public Debt, Aug. 2007

Creditor	In USD bn.	Share (percent)
IFIs	4.2	52
Paris club	2.2	28
Other bilateral	0.4	5
Private - London Club	1.1	14
Other private	0.1	2
Total	**8.1**	**100**

Source: NBS.

5.   **But these gains are not sustainable without long-lasting improvements in flow balances—inconsistent with the recent fiscal slippages.** Following gradual improvements in 2002–05, fiscal policies sharply reversed posting deficit in 2006 and 2007. Combined with

generous pay raises in the public sector, these slippages forced a tighter monetary policy. This, in turn, contributed to a rise in the stock of central bank securities (about 8 percent of GDP) and an appreciation, resulting in quasi-fiscal losses of the central bank (over one percent of GDP in 2006). Moreover, the resulting burst in aggregate demand further fueled current account deficits, thereby aggravating external sector vulnerabilities. In combination with accelerated spending of the one-time privatization receipts, these imbalances, if continued, can revive public sector vulnerabilities in the years ahead.

B. External Sector Vulnerabilities

6.   **Structural policy weaknesses ultimately resulted in a relatively slow transformation of Serbia's productive sectors.** Consequently, the rising import demand and large capital inflows, half of which were debt-creating, have been by far outpacing domestic supply. This translated into sharply rising current account deficits (Figure 2).

Figure 2. External Debt and Current Account
(in percent of GDP)

Source: National Bank of Serbia.

7.   **The persistent external deficits were partly financed by rapid accumulation of private external debt.** External indebtedness of the private sector more than doubled in the past three years. Over three quarters—or 100 percent of exports—is owed by the domestic non-bank sector which is not fully hedged against exchange rate risks. And whereas the external debt in the public sector declined because of one-time external receipts, the hikes in private indebtedness are due to persistent structural imbalances between domestic spending and saving.

Figure 3. Exports in Selected Emerging Market Economies

Sources: WEO, NBS, and IMF Staff estimates.

8.   **These developments are particularly worrying given a small export base.** The volume of exports currently stands at only 27 percent of GDP—one of the lowest in the region—and just over half of the country's imports. And the seemingly high growth of exports—which increased by over 8 percentage points of GDP since 2002—is still below average in Emerging Europe (Figure 3).
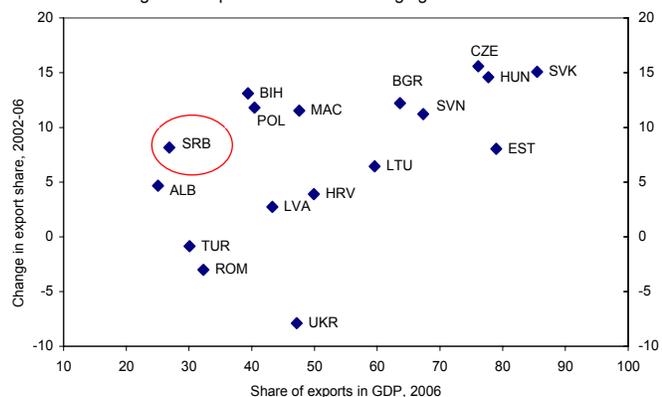
9.   **Furthermore, Serbia's exports are not well diversified.** Metals and food items represent over 40 percent of Serbia's exports, making it vulnerable to terms-of-trade shocks. The high import content of exports further lowers the effective foreign exchange receipts.

Figure 4. Current Account and Exports in Selected European Emerging Economies, 2006 (percent of GDP)

Sources: WEO, NBS, and IMF Staff estimates.

10.   **The combination of high external deficits and export weaknesses make Serbia one of the vulnerable economies in the region.** In a sample of 17 emerging European market economies, three countries — Bulgaria, Estonia and Latvia— have current account deficits larger than that of Serbia (Figure 4). Unlike Serbia, however, these countries are members of the EU and have export sectors that are 2–3 times larger than Serbia's.

11.   **High official reserves mitigate the rising external vulnerabilities, but they need to be interpreted taking into consideration the central bank's contingent liabilities (Figure 5).** Gross official reserves have more than tripled since 2004, reaching USD 14 billion or 7.5 months of imports in 2007—the highest in the region. However, rapid reserve accumulation was partly a result of the prudential tightening and increased reserve requirements on commercial banks' foreign exchange liabilities in 2006. This boosted commercial banks' foreign currency deposits to about USD 5 billion. Because these deposits represent commercial banks' obligations

Figure 5. Forex Reserves and NBS Securities (billions of USD)
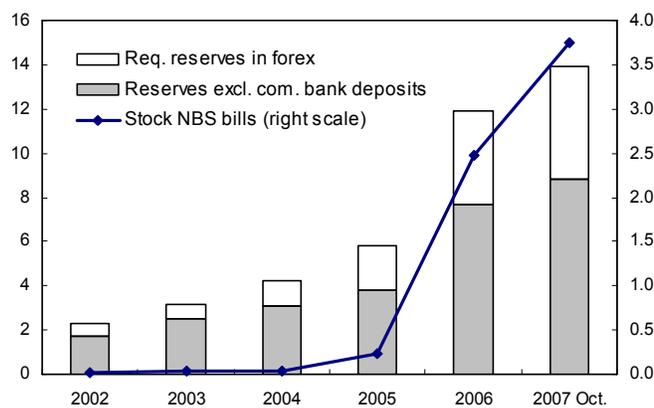
Source: National Bank of Serbia.

Table 3. Reserve Coverage in Selected SEE Economies, 2006

	Reserves 1/	Share of com. banks' deposits (percent) 2/	Reserves net of com. banks' deposits 1/
Serbia	**7.1**	**36**	**4.6**
Bosnia	5.1	0	5.1
Romania 3/	4.8	19	3.9
Bulgaria	4.3	12	3.8
Ukraine	4.2	0	4.2
Albania	4.0	10	3.6
Croatia	4.0	26	2.9
Slovenia	3.1	1	3.1

Sources: Glen and Singh (2004), NBS and Staff estimates.
1/ Gross reserves in months of imports.
2/ Share of forex deposits of commercial banks at the central bank in gross reserves.
3/ Com. bank deposits were estimated based on forex liabilities of com. banks and the 40% reserve requirement.

to the domestic and foreign private sectors, the central bank cannot fully rely on them in times of distress.

12.   **This lowers the effective official reserve coverage and brings it closer to regional levels (Table 3).** High commercial bank deposits obscure cross-country comparisons of reserve coverage ratios because in many of Serbia's peers, banks are either allowed or required to maintain reserves in local rather than foreign currency. After taking this into consideration, Serbia's import cover drops to 4.6 months of imports, which is not significantly higher—accounting for disparities in currency account deficits—than in the rest of the Southeastern Europe.

13.   **Furthermore, the large stock of short-term central bank securities presents an additional risk to official reserves.** The tight monetary policy in 2006–07—and the associated high dinar/euro interest rate differentials—attracted over USD 3 billion in commercial banks' investments in the two-week repo securities. Despite their dinar denomination, the investments also reflected carry trade by foreign banks, and were a major driving force behind the fast reserve accumulation. Thus, a shock to investors' confidence in the dinar could to lead to major pressures on reserves. Notwithstanding Serbia's floating exchange rate regime, such pressures need to be accounted for as a contingency when examining reserve coverage. After subtracting both the commercial banks' deposits and the stock of NBS bills, official reserves drop to just about 3 months of imports, underscoring the underlying vulnerability.

C. Financial Sector Vulnerabilities

14.   **The banking sector underwent a significant transformation in the past five years (Figure 6).** Increased foreign presence (over 70 percent of the market) brought about technological innovation, new credit products, and access to credit lines from abroad. As a result, bank assets more than quadrupled since 2002 and their composition is more diverse.

Figure 6. Deposit Banks: Structure of Assets (Billions of RSD)

Source: National Bank of Serbia.

15.   **Along with growth of the banking sector, household credit also surged.** Virtually non-existent before 2002, it expanded almost tenfold, reaching 22 percent of bank assets and 12 percent of GDP as of October 2007 (Table 4). The share of Serbia's household credit in GDP is still among the lowest in the region (Figure 7). This partly fits the common "catch-up" explanation of the credit booms in Eastern Europe. That is, that the invigoration of domestic credit markets prompted consumers to use credit to smooth their consumption
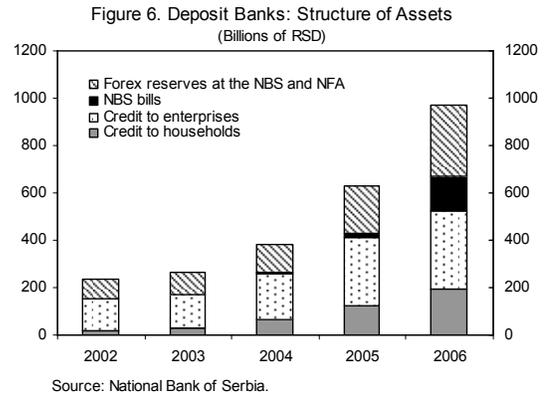
along Serbia's transition path.[2] A comparison with regional averages suggests scope for further accumulation of household debt.

16.   **However, there is less clarity about the appropriate speed of convergence to higher levels of household debt.** Besides longer transition tenures, most of Serbia's peers have gone through much lengthier periods of macro stability and structural transformation, suggesting important differences in these countries' fundamentals. Moreover, household credit growth is also driven by banks' ambitious market share targets, which may lead to concerns over asset quality due to the rapid growth, rather than level, of household credit. In addition, the speed of convergence should be assessed through the prism of the multiplicity and intertwinement of Serbia's vulnerabilities. Even in the absence of immediate credit risks arising from the level of debt relative to measures of household income, such as GDP, vulnerabilities in other areas—notably external—may constrain the households' effective debt-carrying capacity.

Table 4. Household Credit.

	2003	2004	2005	2006	2007 Oct.
Total credit (RSD bn.)	29	64	125	196	279
in percent of GDP	2	5	7	9	12
Twelve-month growth	84	125	94	57	53
RPI-deflated	71	98	65	47	41

Source: National Bank of Serbia.

Figure 7. Household Credit and Euroization in Selected European Emerging Market Economies, 2006
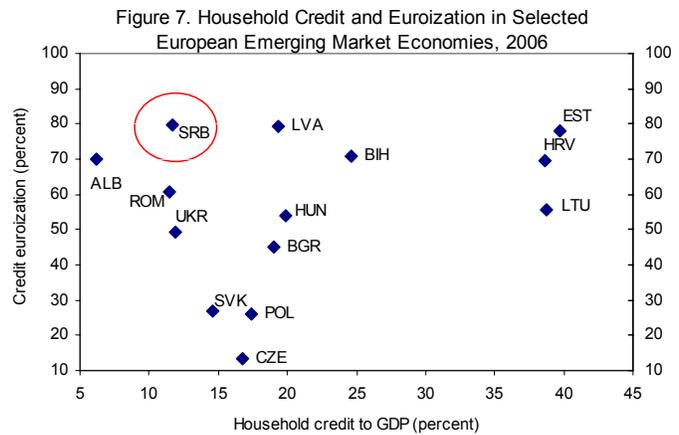
Sources: WEO, NBS, and Staff estimates.

17.   **High credit euroization and significant external vulnerabilities suggest—even after controlling for low debt to GDP ratios—a lower debt-carrying capacity of Serbia's households relative to its neighbors.** The share of forex-denominated and forex-indexed domestic credit exceeds 70 percent and is among the highest in emerging Europe (Figures 7 and 8), exposing borrowers in Serbia to larger currency risks. In addition, low exports, rapidly growing euroized liabilities in the corporate sector, and other external vulnerabilities discussed above are closely linked to the

Figure 8. Household Credit and Euroization
(percent)

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[2] IMF (2006, 2007a, 2007b) discuss rapid credit growth in emerging European economies.

financial sector. In these circumstances, even moderate disturbances may eventually lead to changes in the household sector's balance sheets and could quickly spill over to the rest of the economy. These considerations suggest that on balance, the current rapid growth of household credit is making the country more vulnerable, and that there is a need for reforms that could boost economic growth, thereby creating space for additional household borrowing and allowing consumption smoothing without jeopardizing sustainability.

18.   **The rapid growth of household credit also creates uncertainty about the quality of banks' loan portfolios.** Over 20 percent of bank loans are classified as risky.[3] Although time series data on non-performing loans is not available, a survey of the nine largest banks conducted by the NBS revealed a rise in household NPLs by 43 percent during the first half of 2007. Despite the relatively modest level of household NPL,[4] these trends are worrisome given the rapid growth of the overall loan volumes.

19.   **These uncertainties prompted the central bank to take a tight prudential stance.** In 2006, the NBS to raised reserve requirements on commercial banks' forex liabilities, while in August 2007, it introduced additional regulations limiting retail lending to 150 percent of banks' capital and shortening the maturity of cash loans from ten to two years.

20.   **But so far, the measures seem to have caused disintermediation and higher external borrowing with a mixed net impact on financial sector vulnerabilities.** In response to tighter regulations, domestic lending to enterprises slowed down considerably and its share in banks' assets dropped by ten percentage points since 2005. Alongside, direct off-shore borrowing by enterprises rose sharply during the same period (Table 5).[5] On one hand, the disintermediation lowered financial sector vulnerabilities by transferring some credit risks away from the domestic banking system[6] and lowering interest rates. But it also exposed the corporate sector to heightened exchange rate

Table 5. External Private Debt, 2005-07 1/

	In billions of USD		In percent of total debt
	2005	2007	2007
Commercial banks	3.4	4.7	35
of which short-term	...	1.1	8
Enterprises	2.9	8.9	65
of which short-term	...	0.1	1
Total	6.3	13.5	100
of which short-term	...	1.2	9
Memorandum items:			
Stock of NBS bills	0.2	3.7	28

Source: National Bank of Serbia.
1/ The 2007 numbers are through August.

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[3] This represents the share of loans in C, D, and E risk categories, which, among other criteria, include loans to borrowers with repayments overdue by over 90 days, and are subject to 20–100 percent provisioning. The overall NPL ratio of the nine largest banks surveyed by the NBS in June 2007 stood at 10.4 percent.

[4] The household NPL ratio of these nine banks stood at 4.4 percent. See chapter III for a more detailed analysis of household sector vulnerabilities.

[5] Chapter II discusses corporate sector vulnerabilities in greater detail.

[6] Many off-shore loans are guaranteed by domestic banks which raises financial sector vulnerabilities.

risks and created moral hazard because more risky borrowers will generally be less able to borrow off-shore. Similarly, the initial slowdown of household credit growth in September 2007, was followed by acceleration in October and November, indicating circumvention.

D. Concluding Remarks

21. **High capital inflows and rising vulnerabilities underscore the importance of a comprehensive approach to ensuring stability in the context of transition.** Such an approach could be threefold, reflecting the need to strengthen aggregate supply, contain growth of domestic demand, and minimize vulnerabilities stemming from the rising mismatches in the private sector. Strong structural reforms are crucial to improving the economy's capacity to efficiently absorb foreign inflows in a sustainable fashion, and to generate domestic savings. This includes continued restructuring, privatization, and improvements in the business environment. Greater absorptive capacity, in turn, would eventually lower pressures on the public sector. In the meantime, however, constraining public spending is important to create space for rising private demand, while helping to reduce the external deficit and alleviating pressures on monetary policy. Finally, financial sector policies need to explore ways of limiting exposures to exchange rate risks.

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II. FINANCIAL CONDITIONS IN THE CORPORATE SECTOR[7]

> **Objective:** To assess the evolution of Serbia's corporate sector vulnerabilities based on stock variables, drawn from companies' balance sheets, as well as data on domestic and off-shore corporate borrowing.
>
> **Main findings:** While standard balance sheet indicators appear to be broadly adequate relative to international standards, they mask a substantial build-up of exposures to exchange rate, maturity, and rollover risks stemming from the recent surge in foreign credit.
>
> **Policy implications:** Productivity enhancing structural reforms and developing domestic currency capital markets would be instrumental to reduce risks stemming from the rising euroized liabilities.

A. Overview of the Main Balance Sheet Indicators

22.   **Standard balance sheet indicators[8] point to a number of positive trends in the Serbian economy.**[9] The number of socially-owned companies more than halved since 2002, while the total number of companies in the economy rose. Alongside, assets under public and social ownership declined from over 40 percent in 2003 to 25 percent in 2006, while assets in private companies grew strongly (Figure 1). Moreover, GDP growth exceeded growth of assets over the same period, underscoring improvements in efficiency. The economy-wide return on assets—measured by the ratio of GDP to total corporate assets—has increased from 25 percent in 2002 to 33 percent in 2006. As a result, after years of persistent losses, the corporate sector posted an aggregate profit of over 6 percent of GDP in 2006.

Figure 1. Corporate assets by ownership.
(percent)
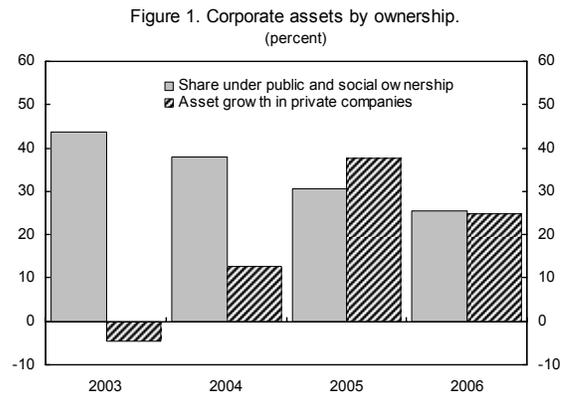
Source: Solvency center of the NBS.

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[7] Prepared by Tokhir Mirzoev (EUR).

[8] Allen et. al. (2002) discuss the use of the balance sheet approach to studying vulnerabilities.

[9] Data on Serbian companies' balance sheets is collected by the NBS Solvency Center. Access to the Solvency Center database is available through the website of the National Bank of Serbia: http://www.nbs.yu/internet/english/15/index.html .

23.   **The corporate sector does not appear to be overly leveraged.** Rapid growth of liabilities was matched by similar growth of assets. As a result, the leverage ratio—liabilities over assets—remained essentially flat since 2004.

24.   **Moreover, strict regulations appear to have helped to avoid maturity mismatches.** High provisioning and reserve requirements have discouraged short-term borrowing domestically, and—combined with a ban on private short-term external borrowing—have contained growth of short-term liabilities. Overall, both maturity and leverage indicators seem broadly in line with international norms (Table 1).

Table 1. Corporate Sector Leverage and Debt Maturity Indicators in Selected Economies, 2000 1/

	Leverage	Maturity
Argentina	41	31
Brazil	62	37
Czech Republic	45	43
Hungary	35	31
Poland	44	31
Turkey	62	52
Israel	40	28
Median for developed countries	52	36
Median for emerging countries	49	36
Serbia (2006)	**49**	**35**

Source: Glen and Singh (2004) and NBS Solvency Center.

1/ Leverage is measured as the ratio of total liabilities in total assets; maturity is measured as a ratio of short-term liabilities to total assets (in percent).

25.   **These indicators, however, need to be interpreted with caution for several reasons.** First, the balance sheet in Table 1 is aggregated, but not consolidated—the liabilities include both inter- and intra-sectoral corporate obligations. This complicates interpretation by masking the net liability position of the sector.[10] Second, in many cases, the maturity structure of liabilities is based on the definitions of "short-term" and "long-term" which were used during loan origination, rather than on the schedule of remaining repayments. Third, the data does not distinguish currency denomination of assets and liabilities, masking the rising exposures to exchange rate risk in recent years. These issues are addressed below by examining in greater detail the structure of the recent credit flows into the corporate sector.[11]

B. Vulnerabilities Stemming from the Recent Credit Growth

26.   **Growth and other improvements in the corporate sector were in part enabled by increased borrowing, which has accelerated markedly since 2004.** With low own resources and non-existent capital markets, companies had to rely heavily on credit—both domestic and external—to finance their expansion. Thus, corporate debt rose from 13 percent of GDP in 2002 to over 37 percent

Figure 2. Non-bank Corporate Debt by Lender
(percent of GDP)

Other external
Non-resident banks
Resident banks
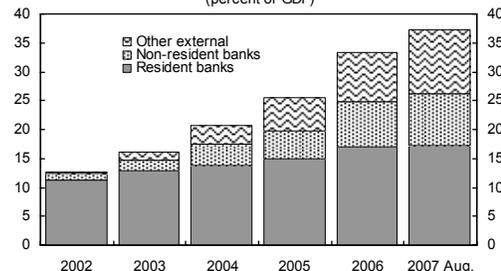
Source: NBS Solvency center.

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[10] The low leverage ratio may also reflect London Club debt restructuring and other write-offs, while new loans mostly represent borrowing after December 2000, which may also partly explain favorable debt maturity.

[11] Sorsa et al. (2007) discuss the increased vulnerability to financial risks in Southeastern Europe.

in August 2007 (Figure 2).[12] The bulk of this expansion was due to a sharp growth in external borrowing. The latter was partly induced by high marginal reserve requirements on domestic banks' foreign exchange liabilities, as well as by the arrival of international companies—in the course of privatization—with easier access to foreign credit. High reserve requirements prompted foreign-owned banks in Serbia to channel credit directly from parent offices abroad. However, a closer look at the structure of foreign loans reveals a significant worsening of the corporate sector's financial position (see below).

27.   **Serbian companies have been borrowing externally on increasingly less favorable terms since 2004.** A formal classification of 'medium-term'—applied to loans maturing in over one year—has allowed companies to continue borrowing off-shore. In 2002–04, long-term loans with over 5 year maturity were the fastest growing component of foreign credit. Since then, however, their share has dropped markedly, while the share loans maturing in 1–3 years nearly doubled (Figure 3) over the same period. At the same time, almost all bank loans and over three quarters of loans from non-banks have adjustable interest rates, subjecting companies to interest rate risks (Table 2).

Figure 3. Maturity Structure of External Non-bank Corporate Debt (percent of total)

Source: NBS.

Table 2. Average Terms on External Corporate Borrowing, August 2007

	Debt (USD bn)	Average interest rate	Share of credit with adjustable rates
Total	8.15	5.37	...
Non-resident banks	4.50	5.20	98.15%
Other	3.7	5.58	75.23%

Sources: NBS and Staff calculations.

28.   **This resulted in shorter effective maturity and heightened rollover risks**. With repayments of the longer-term pre-2004 debt nearing, and the average maturity of new loans shortening, Serbian companies' external short-term financial obligations have increased substantially. As of June 2007, over 50 percent of the outstanding external debt—11 percent of the 2007 GDP—was to be repaid or refinanced before 2010 (Figure 4).

Figure 4. Repayment Schedule of the External Non-bank Corporate Debt, as of June 2007

Source: NBS.

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[12] Data on private non-bank corporate external debt includes loans contracted after December 20, 2000.

29.   **The increased accumulation of arrears on external non-bank private debt is partly a reflection of the worsening terms of credit.** Arrears on cross-border loans have
been on the rise in 2003–06, nearly doubling to 7.7 percent, before declining somewhat to 6 percent in the first eight months of 2007 (Figure 5). This level of arrears most likely implies an even higher ratio of non-performing loans (NPL), underscoring substantial vulnerability to possible adjustments in risk premium. Moreover, since many of the cross-border loans are backed by guarantees from resident banks, the rising NPL ratios are also increasing domestic financial sector vulnerabilities.

Figuret 5 . Arrears In Percent of External Non-bank Corporate Debt

Source: NBS.
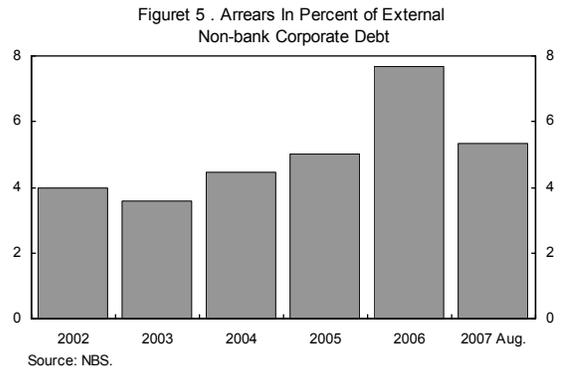
30.   **The biggest risk to corporate sector balance sheets is posed by high liability euroization.** With over 70 percent of domestic credit either indexed or denominated in euros, and with external credit reaching 54 percent of the corporate debt, the effective euroization rate of corporate sector financial liabilities exceeded 85 percent in August 2007. Even in the absence of large shocks to the exchange rate, this level of exposure raises concerns over the corporate sector's ability to finance these liabilities, particularly given the small and vulnerable export sector (see Chapter I). By this measure, Serbia was one of the most vulnerable countries in the region as of mid-2007 (Figure 6).

Figure 6. Cross-border foreign bank credit to firms in Emerging Europe, 2007Q2 (percent of annual exports)

Sources: Bank of International Settlements, the NBS and WEO.
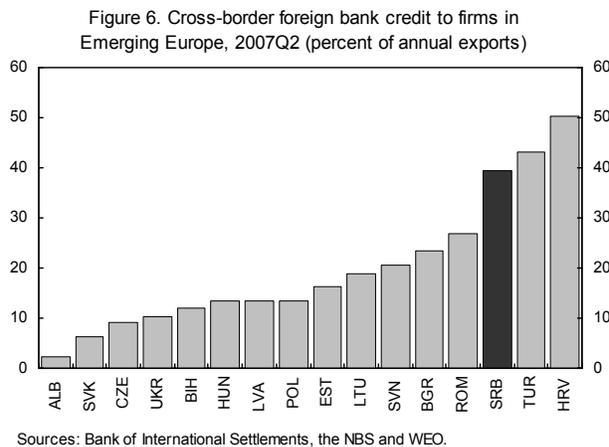
31.   **High liability euroization raises the potential economic costs of shocks to the exchange rate.** Agénor and Montiel (1999), among others, discuss the dangers of currency mismatches. When a firm's assets are denominated in local currency, and its liabilities are in foreign currency, a depreciation could lead to a sizeable reduction in net worth. The latter, in turn, would increase the risk premium, making borrowing more difficult. Such a sudden change in borrowing costs (or ability) could not only lead to lower investment, but may also

expose maturity mismatches and aggravate rollover risks, leading to costly defaults. These effects could outweigh the competitiveness gains from a depreciation.[13]

32.   **Balance sheet stress tests were employed in order to gauge the extent of corporate sector exposures to exchange rate risk (Table 3).** Under assumptions of fixed assets denominated in dinar and a euroization rate of liabilities and liquid assets of 80 percent, a nominal depreciation of 10 percent would raise the corporate sector's financial liabilities by roughly 8 percent, squeezing net worth by 4 percent. In the worst scenario considered—when firms are caught with half of liquid assets in euros and a large depreciation of 50 percent—the liabilities rise by 40 percent while the net worth would shrink by over a quarter. These effects capture only the first stage in the process outlined above. In the second stage, the lenders could raise interest rates—possibly on both new and old loans—in order to reflect the increased risk. This could lead to further hikes in liabilities, potentially pushing firms into default and/or forcing a drop in output.

Table 3. Aggregate Corporate Sector Balance Sheet: Stress Tests 1/

	Pre-shock 2006	80% euro-indexed liquid assets			50% euro-indexed liquid assets		
Shock (size of depreciation)		10%	20%	50%	10%	20%	50%
Balance Sheet (in RSD billions)							
Assets	6,360	6,476	6,592	6,940	6,432	6,505	6,722
Fixed assets (dinar-denominated)	3,911	3,911	3,911	3,911	3,911	3,911	3,911
Short-term Assets	2,219	2,335	2,451	2,799	2,291	2,364	2,582
Liabilities	3,121	3,366	3,611	4,347	3,366	3,611	4,347
Long-term liabilities	848	915	983	1,187	915	983	1,187
Short-term liabilities	2,217	2,395	2,572	3,104	2,395	2,572	3,104
Deferred tax and other liabilities	56	56	56	56	56	56	56
Equity	3,239	3,110	2,981	2,593	3,066	2,894	2,376
Impact							
Change in liabilities, percent	...	7.9	15.7	39.3	7.9	15.7	39.3
Change in equity, percent	...	-4.0	-8.0	-19.9	-5.3	-10.7	-26.7
Short-term assets to ST liabilities, percent	100	98	95	90	96	92	83
Liabilities to total assets, percent	49	52	55	63	52	56	65

Source: NBS Solvency Center and IMF Staff Calculations.

1/ Assumptions: liability euroization of 80%; dinar denomination of all fixed assets, and tax-related assets and liabilities; euroization rate for liquid assets refer to share of short-term receivables and cash in Table 1 denominated in euro.

C. Concluding Remarks

33.   **The considerations above suggest that the high growth of credit in recent years has made Serbian companies more vulnerable.** While the still low leverage may insulate the sector in the short run, the present trends could dissolve this advantage. This calls for continuous monitoring and analysis of "early warnings" based on the underlying trends. In addition to productivity-enhancing structural reforms, developing local capital markets

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[13] In 1995, external debt to foreign banks in East Asian emerging markets ranged between 11 and 55 percent of GDP. The consequences of these exposures became apparent in 1997, when large depreciations led to sharp recessions (See Cook (2004)).

would be important going forward in order to help companies hedge against exchange rate risks, as well as to stimulate dinar borrowing domestically, thereby relieving the rising euroization-related vulnerabilities.

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Table 4. Aggregate Corporate Sector Balance Sheet

	2002	2003	2004	2005	2006
	In billions of RSD				
Assets	4,018	4,355	4,443	5,465	6,360
Fixed assets	2,182	2,376	2,802	3,462	3,911
buildings and equipment	1,821	1,972	2,408	2,632	2,974
long-term financial placements	250	275	337	761	813
other assets, incl. intangible	111	129	56	70	124
Current Assets	1,049	1,205	1,491	1,810	2,219
inventories	370	424	516	632	725
fixed assets for sale	0	0	0	0	30
short-term receivables and cash	665	761	970	1,171	1,451
pre-paid taxes	13	20	5	8	14
Net gain over capital	787	775	151	192	230
Liabilities	1,694	1,850	2,218	2,707	3,121
Long-term liabilities	298	336	508	741	848
long-term loans	260	282	388	578	619
other long-term liabilities	38	53	120	163	228
Short-term liabilities	1,207	1,328	1,673	1,920	2,217
short-term financial liabilities	201	242	299	391	462
operating liabilities	899	1,002	1,047	1,173	1,361
other short-term liabilities	108	85	326	356	394
Deferred tax and other liabilities	189	187	37	46	56
Equity	2,324	2,505	2,225	2,757	3,239
	In percent of total assets				
Assets	100	100	100	100	100
Fixed assets	54	55	63	63	61
buildings and equipment	45	45	54	48	47
long-term financial placements	6	6	8	14	13
other assets, incl. intangible	3	3	1	1	2
Current Assets	26	28	34	33	35
inventories	9	10	12	12	11
fixed assets for sale	0	0	0	0	0
short-term receivables and cash	17	17	22	21	23
pre-paid taxes	0	0	0	0	0
Net gain over capital	20	18	3	4	4
Liabilities	42	42	50	50	49
Long-term liabilities	7	8	11	14	13
long-term loans	6	6	9	11	10
other long-term liabilities	1	1	3	3	4
Short-term liabilities	30	30	38	35	35
short-term financial liabilities	5	6	7	7	7
operating liabilities	22	23	24	21	21
other short-term liabilities	3	2	7	7	6
Deferred tax and other liabilities	5	4	1	1	1
Equity	58	58	50	50	51
of which: share capital	37	36	48	47	46
Memorandum Items:					
Number of reporting companies	67,248	74,510	76,372	75,878	76,638
of which: publicly owned	318	650	522	488	487
socially owned	2,464	2,014	1,704	1,311	1,063
Current assets to short-term liabilities, percent	87	91	89	94	100
GDP, RSD bn.	1,020	1,172	1,431	1,750	2,126
Ratio of GDP to total assets, percent	25.4	26.9	32.2	32.0	33.4

Source: NBS Solvency center.

III.   Household Credit[14]

> **Objective:** Assess macro-financial vulnerabilities related to household credit growth.
>
> **Main findings:** Household balance sheet risks originate from currency mismatches due to credit euroization, which in turn is an indirect credit risk for banks. However, the overall level of household credit is still low and buffers have been installed through prudential measures.
>
> **Policy implications:** Financial vulnerabilities are on the rise and are amplifying macro imbalances. Ensuring financial stability will entail further strengthening of prudential regulation accompanied by supportive macroeconomic policies.

A. Introduction

34.   **Rapid credit growth in emerging European economies has ushered a spirited debate as to whether this catching-up process has ramifications for financial stability.** Notably, the share of private sector credit allocated to the household sector has grown significantly in most emerging European countries, including Serbia. Balancing the benefits of access to finance for households while tackling the sustainability of increasing vulnerabilities, has become a key policy challenge.[15] This paper analyzes the vulnerabilities related to household credit growth in Serbia, while providing a cross-country perspective on key policy questions related to macro-prudential concerns, balance sheet mismatches, impact of credit euroization, and the framework and effectiveness of policies.

B. Background

35.   **Serbia has been a late riser in financial deepening among the emerging European economies (Figures 1 and 2).** The overall level of private sector credit is lower than in most of its European peers, at about 10 percent of GDP as of end-2006. The pace of growth of total private sector credit in Serbia, however, has been one of the highest among its peers over the past six years.

36.   **Household credit has been the main driver of credit expansion in Serbia**, having risen from a marginal share in 2000 to 11.7 percent of GDP as of September 2007 (Figure 3). Over the same period, its share in total private sector credit has more than quadrupled to 41 percent. Consumer loans account for about 58 percent of total household credit in Serbia, and while the share of mortgages is low at about 27 percent as of September 2007, it is growing rapidly (Figure 4). With a relatively young market, the most important product is

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[14] Prepared by Mangal Goswami (MCM).

[15] See IMF (2006), chapter II, for a more detailed discussion on this topic.

cash credit—uncollateralized general purpose consumer loans—although the recent prudential measures aim at stemming its growth. Most household loans carry variable interest rates and are denominated in or indexed to foreign exchange.

Figure 1. Selected Household Credit, 2006
(Percent of GDP)

Average = 19.8
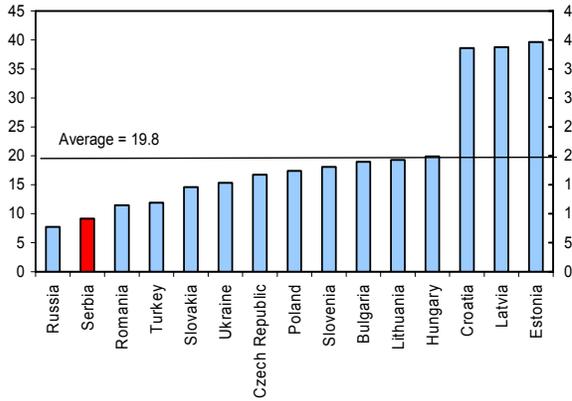
Source: IMF staff estimates.

Figure 2. Selected Household Credit, 2006
(Percent of total private sector credit)

Average = 35.1
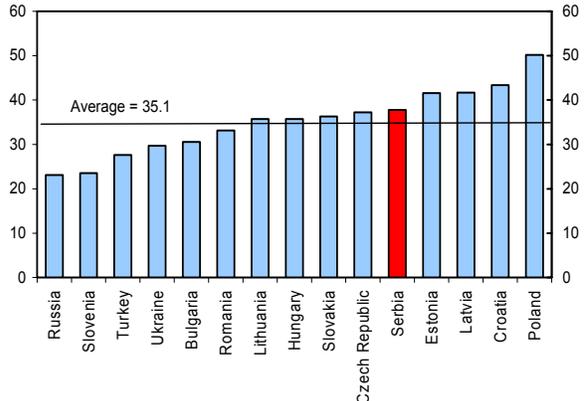
Figure 3. Serbia: Household Credits, 2002-07

Percent of Private Sector Credit, LHS
Percent of GDP, RHS

2002   2003   2004   2005   2006   2007 M6   2007 M9
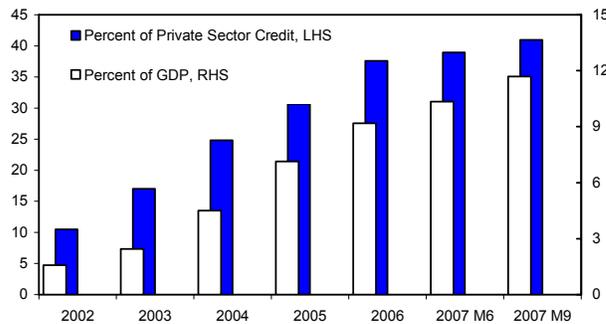
Source: NBS.

Figure 4. Serbia: Components of Household Credit,
September 2007 (percent)

Other 16%
Mortgage 26%
Consumer 58%
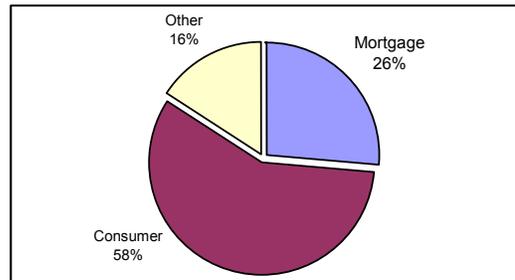
Key Issues

37.   **The rapid growth in household credit in Serbia reflects a combination of factors related to economic convergence and financial deepening.** This is in line with the empirical evidence indicating a positive relationship between the household credit-to-GDP ratio and per capita income for most emerging European economies (Figure 5). Expectations of sustained growth—linked to EU convergence—and financial liberalization can lead more households to borrow against future income growth. Lower long-term interest rates and a decline in inflation may have also stimulated the demand for and

Figure 5. Household Credit and Per Capita GDP
in Emerging Europe, 2006

Credit to Households (% of GDP)

Portugal   Spain

EU13

Croatia   Estonia
Latvia   Greece

Bulg.   Hun.
            Lith
            Pol.   Slovenia
Rom.   Czh.
Serbia   Slovakia

GDP per capita (in euros)
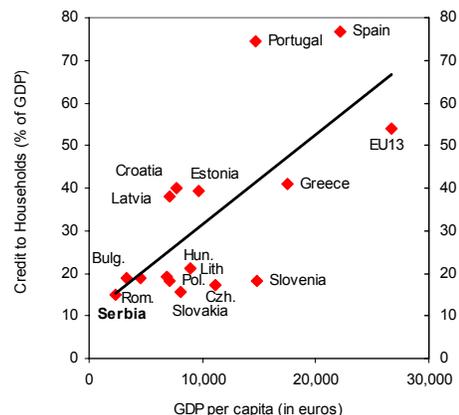
Source: ECB.
Note: EU13 countries include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia and Spain.

supply of credit. Furthermore, foreign banks, which dominate the Serbian market, have aggressively focused on increasing market share in consumer finance which offers higher margins. Cross-border capital flows, facilitated by these banks, have augmented the availability of funds to finance household credit in Serbia.

38.   **Rapid household credit growth raises both macro and prudential concerns.** Prudential concerns are related to the ability and resources of regulatory and supervisory authorities to comprehensively address the various sources of risk (e.g., balance sheet mismatches). The main challenges are posed by the rapid growth in household credit and the ability of foreign banks to raise alternative funding sources.

39.   **One macro implication of credit booms is the possibility of asset market, notably real estate market, imbalances.** A combination of high demand for housing, enabled by a credit boom, and limited supply can inflate asset prices, thus increasing the consumers' net worth. The latter could lower risk premia and—along the lines of Bernanke and Gertler (1989)—encourage greater leverage, thereby rendering households more exposed to asset price fluctuations (Ortalo-Magne and Rady, 2006). In many emerging European countries, house prices have experienced rapid growth and generated concerns of potential asset price inflation (Sirtaie and Skamenlos, 2007). In Serbia, the exemption from mandated reserve requirements for mortgage loans insured by the National Mortgage Insurance Company, has contributed to a sharp increase in housing loans, although the extent of housing price increases is difficult to fathom due to the lack of reliable data. Rising mortgage lending, notably in or indexed to foreign currency, albeit from a low base, creates vulnerability to a decline in house prices, higher price volatility, and exchange rate depreciation with potential downside risks to nonperforming loans.

40.   **Furthermore, rapid credit growth—enabled by large foreign inflows and expansionary domestic policies—also led to rising external deficits and vulnerabilities.** Besides the large capital inflows, the high credit growth in Serbia was compounded by large wage increases of 20–30 percent in the public sector and fiscal relaxation during electoral cycles. These increased household income and encouraged even greater leverage. The resulting growth of aggregate demand outpaced supply, leading to a widening of the current account deficit (Figure 6). As discussed in chapter V, the importance of credit in explaining the rising current account deficit in Serbia is statistically significant.[16]

Figure 6. Serbia: Net Credit to Private Sector and Imports, 2007 (percent)

Imports in million euro, (right scale)

Private non-bank external credit

Sources: NBS and IMF staff. estimates.

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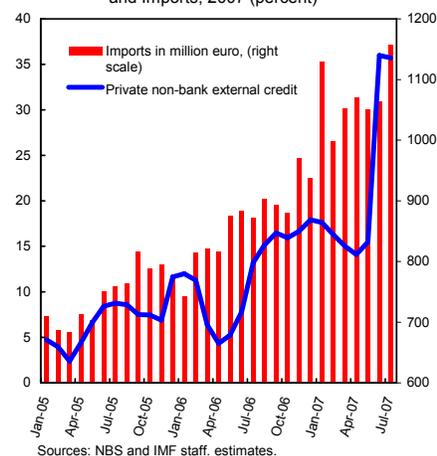
[16] See also Kraft (2006) who finds that an increase of 1 percentage point of GDP in the flow of household credit is associated with 0.57 percentage point of GDP deterioration in the trade balance in the case of Croatia.

41.   **Despite the growing indebtedness, Serbian households appear to have a positive net worth.**[17] Deposit growth and other sources of income, such as remittances, have so far mitigated the rise in gross liabilities of the household sector. Moreover, the current debt servicing burden is relatively low, aided by prudential measures that limit monthly installments on household debt to 30 percent of net monthly income.

42.   **Nevertheless, Serbian households' balance sheets appear to be exposed to risks originating from currency mismatches and interest rate exposure.** Over 80 percent of loans to households are linked to foreign currencies (mainly euro and to a lesser extent the Swiss franc) and they largely carry variable interest rates (Figure 7). Even though households' foreign-currency deposits are sizeable on aggregate, borrowers and savers may only partly overlap. As in many emerging markets, there is a concern that the consequences of a large depreciation may not be fully understood by unhedged borrowers.[18] Thus, the rising exposure to exchange rate risks creates indirect credit risks for banks, which could face a sharp deterioration in asset quality if exchange rate risks were to materialize.

Figure 7. Credit Euroization, 2006
(percent of total credit)

Source: WEO.
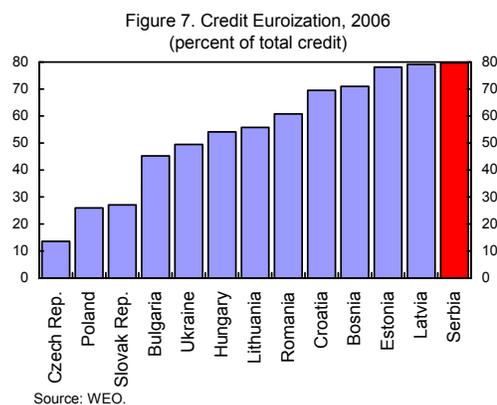
43.   **Tentative calculations by staff indicate that the exposure of Serbian banks to the household sector makes them vulnerable to sharp exchange rate shocks, albeit with some mitigating factors.** A dinar depreciation in the order of 25 percent depreciation, for instance, could result in a decline in the capital-to-asset ratio of the banking sector from 19 percent to about 14½ percent. While such a shock would not make the risk-weighted capital adequacy fall below the minimum requirement of 12 percent, it could constrain banks' ability to extent new credit, aggravating rollover and interest rate risks.[19] These results, however, are to be treated with caution, as they are based on the banking system's exposure to the household sector only. Similar calculations that include the entire foreign currency balance sheet position of the banks indicate a lower level of vulnerability. Nevertheless, the concern over a potential deterioration in asset quality and profitability from an exchange rate shock is compounded by the recent increase of household non-performing loans, although from a low

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[17] Household leverage data for Serbia is limited, and is constrained by the lack of comprehensive asset data (other than bank deposits). Tentative estimates, provided by Sorsa (2007), however, suggest that Serbian households have positive net worth, albeit declining.

[18] See the April 2006 Report on Financial Stability of the Central Bank of Hungary.

[19] The exchange rate sensitivity test was conducted only on the foreign currency denominated/indexed household portfolio of assets and liabilities.

base.[20] That said, the net financial position of the banks and the low base of household credit allows the financial system to better withstand such shocks. Also, household assets, including mattress money, in foreign currency as well as foreign remittances could mitigate these concerns.

C. Policy Developments and Lessons from Other Countries

44.   **In general, prudential regulation of household credits has to strike a balance between encouraging healthy growth of credit while minimizing potential economic distortions of regulatory compliance.** Ensuring that minimum prudential standards in household lending are met and not circumvented is a key challenge in most emerging European countries. In particular, verification of income (especially foreign exchange income), loan-to-value and loan-to-income ratios, and maturity mismatches are key parameters for enforcement. A public information campaign on the risks of borrowing is beneficial. Regulators generally consider certain benchmarks, such as maximum loan-to-value ratios (70–80 percent), maximum debt-service/income ratios (35–40 percent for all household credits), a minimum repayment rate (10 percent of outstanding balance for credit cards) and a maximum credit card limit (equal to 3–4 months income). Strict assessment of real estate collateral is also important.

45.   **The NBS has recently implemented tighter prudential policies and continues to strengthen its regulatory and supervisory framework**. The new regulations tightened foreign exchange exposure limits, increased capital requirements, broadened reserve requirements on foreign liabilities, and extended regulatory coverage to leasing companies (Box 1). Banking supervision has improved following the implementation of the new banking law in October, 2006. After the establishment of the Central Credit Registry in mid-2002, the NBS has launched public information campaigns on financial literacy that articulate the risks of borrowing.[21] A wide range of material has been made available to bank customers drawing their attention to the risks involved in various banking products, including those denominated in, or linked to a foreign currency. The credit bureau has significantly enhanced the availability of credit information. Additionally, the monitoring of credit risk induced by foreign exchange risk will be improved and new rules for unhedged borrowers will be implemented. Banks have adopted the NBS's framework for the analysis of borrowers' exposure to exchange rate risks, although its implementation remains difficult. Capital regulation to regulate the management of market risks has been issued. A formal MOU has been signed with the national supervisors in Greece, while informal contact is

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[20] A survey of the nine largest banks revealed a 43 percent increase in non-performing household loans during the first half of 2007, although the household NPL ratio was still low at 4.4 percent in June 2007. While the overall NPL ratio of these nine banks reached 10.4 percent in June, it was 3.5 percent after accounting for provisions.

[21] See Jelašić (2007).

being maintained with other relevant home supervisors. The Bank Supervision Department of the NBS is currently working on a strategy for the implementation of Basel II standards.

Box 1 Serbia: Recent Prudential Measures to Manage Risk of Rapid Credit Growth

- HH debt to income ratio: monthly installment cannot exceed 30% of net monthly income. This can go up to 50 percent including mortgages.

- Maximum maturity of cash loans to households was lowered to 2 years.

- Limit the minimum monthly repayment on revolving credit cards (5 percent) and maximum maturity of certain consumer loans (5 to 7 years).

- A risk weight of 125 percent to be used in the calculation of risk-weighted assets that are FX or FX indexed loans if the borrower can't rely on inflow in the same currency. Currently this is only for exposures exceeding dinars 10 million. In 2008, the minimum threshold will be lifted.

- HH lending cap to be reduced from 200 percent of Tier I capital to 150 percent (from 2008). All mortgages are included in this calculation.

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46.   **The tightening of prudential measures and strengthening of risk management of banks is in line with developments in several other emerging European countries.** Many emerging European countries with a high degree of euroization are taking measures to tighten prudential regulations on foreign-exchange linked loans to households. These include higher/differentiated risk-weights on unhedged foreign currency loans (Croatia, Poland, and Slovakia), higher liquidity requirements (Croatia and Romania), and conducting more frequent stress tests (Czech Republic, Hungary and Poland). Some countries are even taking administrative measures, such as credit ceilings, as a last resort measure. There has been enhanced supervision of banks with foreign exchange lending (more frequent off-site and on-site inspections), especially the ones that are in a weaker position. Countries have also encouraged financial institutions to conduct public awareness campaigns to educate borrowers on the risks involved in foreign exchange lending (Hungary). Several central banks have pointed to the risks associated with mortgage loans in foreign currencies.

47.   **These measures, however, have shown mixed results in curbing credit growth, although they have generally strengthened the health of the financial system by building buffers.** Credit growth, especially to households, remains strong in many emerging European countries, aided by foreign banks' ability to obtain funds through rapid deposit growth and borrowing from abroad (including from parent banks). Circumvention of measures (administrative or prudential) by borrowers through direct foreign borrowing or from less supervised financial institutions (including through leasing and credit cards) have been common. For instance, in Croatia, direct credit controls led to circumvention and disintermediation, while in Estonia and Romania, increased financing from abroad continued to support strong credit growth. Administrative limits on bank credit have had some impact in Bulgaria but broader credit growth remained unabated. Nevertheless, countries like Ukraine and Bosnia saw some slowdown following tightening measures. In the case of

Serbia, it remains to be seen whether the effectiveness of macro-prudential and supervisory policy measures will be durable.

D. Elements of a Way Forward

48.   **Despite low levels of consumer credit, its rapid growth raises vulnerabilities.** The concerns over high credit growth are mitigated by a relatively low level of consumer indebtedness, the tight prudential stance of the NBS, and a perception that the majority of Serbian banks, which are in foreign ownership, would likely receive support from their parent offices in times of distress.[22] That said, the potential under-pricing of risk by foreign banks pursuing aggressive market share targets could lead to pressures on their balance sheet. Further risks stem from a sudden stop in capital flows, especially if the tight global credit conditions persist and/or domestic political issues remain unresolved. Moreover, the rising external vulnerabilities may pose substantial risks to households' balance sheets.[23] Therefore, the authorities are well advised to continue to take measures to prevent excessive build-up of risks in the household and financial sectors through an appropriate mix of macro and prudential policies.

49.   **In general, policies should be designed to safeguard macroeconomic and financial sector stability.** Managing macroeconomic risks and reducing the probability of financial distress, while increasing the resilience to adverse shocks by building buffers, is critical. Indeed, prudential policies have been effective in countries if accompanied by macroeconomic policies including structural reforms. The operating environment for bank lending to households should ensure sound lending practices with high origination standards (e.g., through conservative loan-to-value, debt-service to income and loan-to-income ratios). Administrative controls can generally be circumvented, at least beyond the short term, and should therefore be used judiciously (Hilbers and others, 2005). In developing prudential measures, potential disintermediation needs to be taken into account, as well as the fact that the laws and judicial systems in many emerging countries often provide relatively strong protection to borrowers, resulting in time-consuming, expensive, or ineffective foreclosure and enforcement of creditors' rights, and a weak credit culture.

50.   **Strengthening financial sector surveillance could be enabled by widening the information base to better assess the characteristics of debtors.** Most mature market countries, and increasingly more emerging countries, undertake a more detailed analysis of household balance sheets using micro-level data from household surveys to assess household debt sustainability (as, e.g., in Hungary). The central bank could augment the information collected by the Credit Bureau with asset side data (e.g., on real estate prices from the

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[22] Standard and Poor's (2007).

[23] See Chapter I.

National Mortgage Insurance Corporation) of households, thereby broadening the scope of the overall data analysis.

51.   **Finally, ensuring financial stability will entail close monitoring of banks' risk management and their resilience to shocks.** Despite significant progress, continuing to build supervisory capacity in a fast growing industry will be critical. To this end, the work of the NBS' new financial stability unit that would conduct stress tests would help Serbia better prepare for systemic risks. Furthermore, the NBS, along with the Bankers' Association has to continue to raise the risk awareness of borrowers. Strengthening the dialogue between home and foreign supervisors, to facilitate cross-border supervisory arrangements and crisis management, is another important area in an environment that is dominated by foreign banks. Alongside, the NBS has to continuously monitor banks' liquidity in foreign exchange, in which it cannot act as a lender of last resort. In the medium term, a well-developed capital market could help diversify the financial system and improve the efficacy of monetary policy transmission in a highly euroized economy.

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IV.   CGER-TYPE ASSESSMENTS OF THE REAL EFFECTIVE EXCHANGE RATE[24]

> **Objective**: Explaining the assessment of the level of the dinar real effective exchange rate carried out using CGER-type methodologies
>
> **Main results**: The REER is found to be overvalued in the range of 5–16 percent. The results are to be taken with caution given the significant uncertainties in the calculations.
>
> **Policy implications**: The overvaluation reflects an unbalanced policy mix. It calls for an acceleration of structural reforms and a tightening of fiscal policy that would make room for a less restrictive monetary policy.

52.   This chapter lays out the assumptions made in the CGER-type assessments of the dinar real effective exchange rate.[25] Two GGER-type methodologies were applied: the macroeconomic balance and the external sustainability approaches.[26] The paper first reviews the way the main data limitations were dealt with. It then explains how the underlying current account was estimated, before discussing the application of each approach to Serbia, and drawing the broad policy implications of the findings.

Data limitations

53.   **Data limitations are significant in Serbia**. In particular, the successive break-up of former Yugoslavia in successor states, including the separation of Montenegro from Serbia in 2006, complicates the availability of reliable long time series. Two series were particularly problematic: remittances and Net External Asset Position (NEAP).

Private remittances (Percent of GDP)

Source: NBS
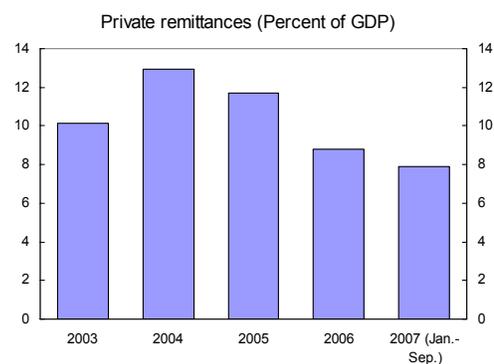
54.   **The quality of remittances data is inadequate**. Remittances have been declining sharply since 2004, dropping from 13 percent of GDP to about 6 percent of GDP in 2007. This made a significant contribution to the widening of the current account over the same period. However, the accuracy of remittances data is not satisfactory, as evidenced by its

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[24] Prepared by Jean-François Dauphin (PDR)

[25] See companion staff report, paragraph 13 and Box 3.

[26] For a full description of the macroeconomic and external sustainability approaches, including the definition of variables and econometric coefficients, see *Methodology for CGER Exchange Rate Assessments*.

frequent and ample revisions. For example, the net amount of remittances received during the first half of 2007 was revised upward by almost two percent of GDP between the release of the balance of payment data as of June and as of August. The Central Bank is working on improving the quality of remittances measurement but, in the meantime, assessing the real extent and nature of the recent decline is challenging. In particular, one needs to disentangle what is a measurement issue from what might be an actual, but temporary, decline and what would be an actual and lasting phenomenon. Following discussions with the Central Bank, staff assumed that a large part of the recent decline falls in either of the first two categories, and that remittances would gradually return over the medium-term closer to, but below, their historical average of about 11 percent.

55.   **There is no available estimate of the Net External Asset Position (NEAP)**. Data on stocks is only available for some components of the NEAP: gross external debt, international reserves of the Central Bank, and international reserves of commercial banks. Estimates of flows exist for most of the other components, at least from the start of the transition period.

Net Foreign Liabilities, 2005-12
(Percent of GDP)
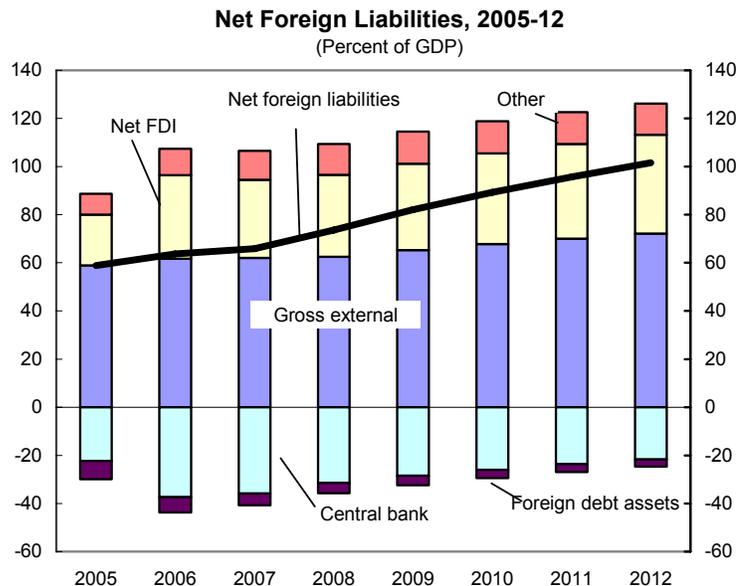
Source: Staff's estimates and projections.

Finally, there is no comprehensive data on foreign debt assets. Staff produced its own NEAP estimates, using stocks where they exist, and approximating stocks as the sum of flows since 1999 (the beginning of the transition period) for other categories where possible. In consultation with the NBS, foreign debt assets were broadly estimated at US$ 2 billion. This produces, of course, only a crude proxy of Serbia's NEAP, not the least because valuation

changes on important categories of assets, such as foreign direct investment (FDI), are not accounted for. At end-2007, the NEAP is projected at -66 percent of GDP. [27, 28]

Underlying current account

56.   **Estimating the underlying current account –an important part of the assessment of the Real Effective Exchange Rate (REER) level— is difficult in the case of Serbia.** The underlying current account is defined as the current account stripped of temporary factors, such as cyclical fluctuations, temporary shocks, and adjustment lags. In a country like Serbia, which is still at an early stage of transition, identifying cyclical fluctuations (or, in other words, defining an output gap) is challenging because these tend to be overshadowed by structural changes.

57.   **In practice, the underlying current account was calculated using staff's medium-term baseline projections, which assume the continuation of current economic policies, stripped off the effect of projected future changes in the REER and the terms of trade**. Assuming, as discussed above, that remittances would return to about 9 percent of GDP, the current account deficit after grants is projected at 13.8 percent of GDP in 2012. The projected REER appreciation of about 15 percent would explain 3.6 percentage points of this deficit. The projected deterioration in the terms of trade by about 5 percent –led by the WEO-assumed drop in metal prices— would explain another 2.3 percentage points. Taking out these two factors from the projected current account gives an underlying current account deficit of 7.9 percent of GDP.

Macroeconomic balance approach

58.   **The macroeconomic balance approach assesses the underlying current account against a "norm" consistent with the economy's fundamental characteristics**. As explained in the CGER paper, an econometric relationship between a country's current account and fundamentals was derived using a panel dataset of 54 advanced and emerging market economies over 1973–2004. The fundamentals include the fiscal balance, the population growth, the population old-age dependency ratio, the initial NEAP, the oil balance, the economic growth and the income level, most of these variables being expressed relatively to trading partners.

59.   **The estimated current account norm is a deficit close to 4 percent of GDP, and the REER change that would bring the underlying current account to this norm is about 16 percent**. The norm was calculated using the above relationship. The fundamentals

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[27] For an in-depth discussion on how to build NEAP data, see Lane and Milesi-Ferretti (2006).

[28] Since the NEAP is negative, its absolute value is also referred to as Net Foreign Liabilities (NFL) position.

were expressed in relation to Serbia's four main trading partners: the European Union, Russia, Bosnia and Herzegovina, and China, which altogether account for about 70 percent of Serbia's trade.[29] Population growth projections for Serbia and its trading partners were obtained from the United Nations' Population Division.[30] The change in the REER was calculated assuming an elasticity of the current account to the REER estimated at 0.25.

Summary Results of the Macroeconomic Balance Approach

Current account (CA) norm (percent of GDP)	-3.8
Underlying current account (percent of GDP)	-7.9
Difference between norm and underlying CA (percent of GDP)	4.0
Elasticity of the CA to the REER	-0.25
REER adjustment needed to bring the underlying CA to the level of the norm (percent)	-16.4

Source: staff's estimates

External sustainability approach

60.   **The external sustainability approach assesses the underlying current account against the current account that would stabilize the net external asset position at "benchmark" values**, given the economy's potential growth rate, inflation rate, and rates of return on external assets and liabilities.[31]

61.   **Defining the appropriate benchmark NEAP in the context of transition is tricky**. Experience in the region shows that the maximum NFL position reached by other countries spanned across a wide range. For calibration purposes, two scenarios were run. The first one stabilized NFL at their projected value at end 2007 (66 percent of GDP). The second one allowed for further build up of liabilities. For calibration purposes, the target in this scenario was assumed to be the mid-point between Serbia's projected 2007 value, and the maximum observed in the region over 1990–2004, which was 100 percent of GDP in Estonia.

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[29] The fifth most important trading partner is Montenegro, for which not all required data was readily available.

[30] UN Population Division's quinquennial estimates and projections, accessible at http://unstats.un.org/unsd/cdb/cdb_advanced_data_extract.asp. Estimates using IMF staff projections yielded very similar results.

[31] In the case of Serbia, due to the lack of reliable data, the rates of return of assets and liabilities were assumed to be the same.

Maximum Net Foreign Liability Position, 1990-2004
(Percent of GDP)
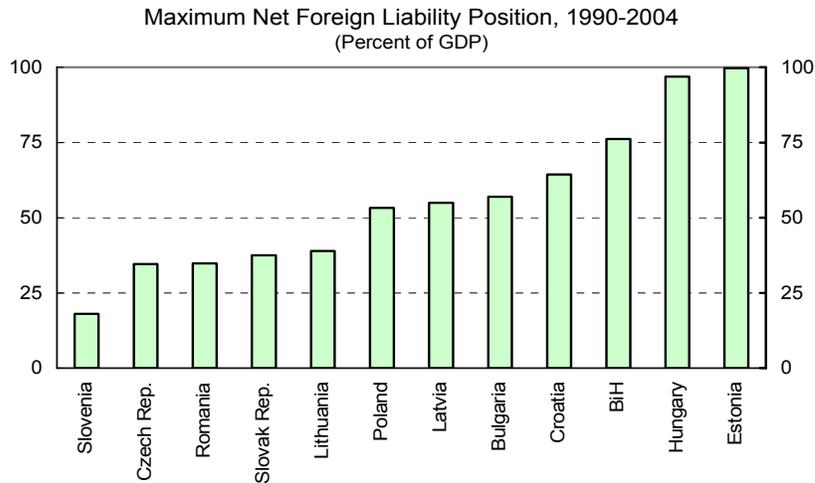
Source: Lane and Milesi-Ferretti (2006).

62.   **In Serbia probably more than in most other transition economies, the medium-term growth potential depends on factors outside the economic realm**. The pace of productivity gains is a key determinant of medium-term growth potential and will depend heavily on the magnitude of future foreign direct investment. This, in turn, will not only depend on the quality of macro-economic policies, but will also reflect international investors' assessment of the prospects for an orderly resolution of the Kosovo status issue and Serbia's accession to the European Union (EU). To illustrate the sensitivity of the external sustainability approach to these uncertain factors, two different assumptions were made regarding the medium-term growth potential. Under the first one, staff's relatively conservative baseline projection of 5.5 percent was used. Under the second one, with clearer EU prospects, a higher –but plausible—growth rate was assumed, calibrated as the 2003–07 average growth rate for 15 Eastern European countries (6.2 percent).

Average Growth Rate in Selected Eastern European Countries
2003-07

Average excluding Serbia: 6.2 percent
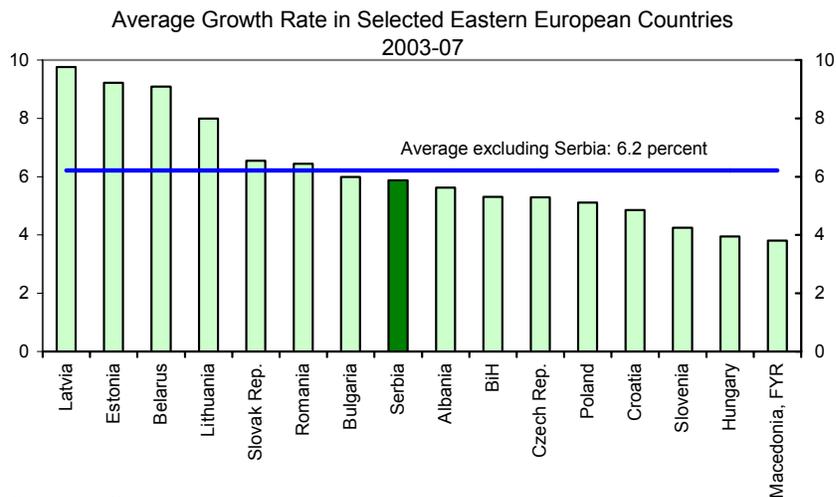
Source: WEO.

63.   **The external sustainability approach also points to an overvaluation of the exchange rate in real terms, but less so than the macroeconomic balance approach.** The current account deficit target resulting from the various assumptions is in the range of 5–7 percent, with a corresponding REER adjustment ranging from 5 percent to 12 percent.

Summary Results of the External Sustainability Approach

	Stabilizing NFL at 66 percent of GDP		Stabilizing NFL at 83 percent of GDP	
	With 5.5 percent potential growth	With 6.2 percent potential growth	With 5.5 percent potential growth	With 6.2 percent potential growth
Required current account balance (percent of GDP)	-4.8	-5.2	-6.1	-6.6
Underlying current account (percent of GDP)	-7.9	-7.9	-7.9	-7.9
Difference between required and underlying CA (percent of GDP)	3.1	2.7	1.8	1.3
Elasticity of the CA to the REER	-0.25	-0.25	-0.25	-0.25
REER adjustment needed to bring the underlying CA to the level of the required CA (percent)	-12.4	-10.8	-7.3	-5.3

Source: staff's estimates.

Policy implications

64.   **The REER assessment calls for a rebalancing of economic policies.** The results of the macroeconomic balance and external sustainability approaches should be considered with caution given the data limitations and the set of assumptions underpinning them. Nonetheless, they consistently point to the dinar being overvalued in real terms. In staff's views, this reflects a policy mix which, with insufficiently rapid structural reforms, loose fiscal policy and restrictive monetary policy, has put the current account on an unsustainable path. Therefore, the problem should be addressed at its roots: structural reforms should be accelerated and fiscal policy tightened, which would make room for a less restrictive monetary policy. This would contribute to reducing the current account deficit, bringing it more in line with fundamentals.

References

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Lane, Philip R., and Gian Maria Milesi-Ferretti, 2006, "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, *1970-2004*," IMF Working Paper No. 06/69 (Washington: International Monetary Fund). (http://www.imf.org/external/pubs/cat/longres.cfm?sk=18942.0).

V. TWIN DEFICITS IN SERBIA[32]

> **Objective:** To quantify econometrically the relationship between the fiscal and the current account balances—the so-called "twin deficits" in Serbia.
>
> **Main results:** The fiscal balance has a strong and significant impact on the current account in Serbia, with elasticity estimates between 0.5 and 1.1. In the baseline estimate, the relationship is found to be one-to-one over two quarters (an increase in the fiscal deficit by 1 percent of GDP raises the current account deficit by 1 percent of GDP). For a panel of SEE countries, however, the twin deficits relationship is more elusive—it is overwhelmed by the impact of investment on the current account.
>
> **Policy implications:** Because fiscal policy has a strong impact on external balances, fiscal tightening can be expected to reduce the current account deficit in the short run.

65.   This chapter explores the relationship between fiscal policy and the external current account in Serbia—the so-called "twin deficits." By definition, since the current account deficit represents foreign savings into the country, it implies domestic dissavings, either from the public or from the private sectors, or both. Ex post, it is important to understand to what extent the external deficit—and its change—was associated with a government deficit or with private sector dissaving. This can be done using national accounts estimates. It is much more difficult, however, to use such observation from the past in a forward-looking context. Public and private savings-investment balances are the result of a large number of economic interactions, and fiscal policy may affect both of them simultaneously, while also being affected in return. Thus, it may be difficult to disentangle the various channels that, in the end, determine the current account. Nevertheless, in a policy making context, it is essential to be able to assess whether an increase in the government deficit will translate into an external deficit, or whether it will somehow be compensated by an increase in private sector savings (as in the case of full "Ricardian equivalence"), and under what conditions.

66.   Our econometric study finds that the fiscal balance has a strong and significant impact on the current account in Serbia with elasticity estimates between 0.5 and 1.1. In the baseline specification, an increase in the fiscal deficit by 1 percent of GDP widens the current account deficit by 0.6 percent of GDP in the same quarter and by 0.5 percent of GDP in the following quarter. The next two sections present a brief overview of the literature and empirical evidence. Section C describes recent current account and fiscal developments in Serbia. Sections D and E present estimation results for Serbia and Eastern and Southeastern European countries, using various econometric approaches. Section F concludes.

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[32] Prepared by Eric Mottu (EUR). Useful comments were received from Peter Doyle and from participants in a November 2007 Seminar at the National Bank of Serbia.

A. Brief Overview of the Literature

67.   **While the accounting of the twin deficits is straightforward, its economics is not.**
The standard analysis of the relationship between the external current account and fiscal
balances starts with national accounts definitions. Indeed, since the current account balance
is equal to the national savings-investment balance, for a given private sector savings-
investment balance, any increase in the government deficit (or dissaving) is equal to an
increase in the current account deficit (or national dissaving). This would imply the so-called
"twin deficits." However, moving from ex post accounting to economics, there is reason to
believe that the government's policy actions would trigger changes in economic variables
that may affect private sector economic decisions, through multiple channels (see below).
These, in turn, may also affect fiscal variables.

68.   **In most countries, twin deficits are not observed at all times.** The U.S., for
example, has experienced episodes of twin deficits in the first half of the 1980s, and again
since the early 2000s. But in between, current account and fiscal balances went in opposite
directions, illustrating a case of "twin divergence."

69.   **While the direct effect of fiscal policy is to increase domestic demand and, thus,
to widen the current account deficit, this direct effect can be either mitigated or
amplified through various channels.**[33]

- In an intertemporal setting, the classic "Ricardian equivalence" (between government
debt and taxes) effect posits that a higher deficit may simultaneously induce higher
private sector savings, as agents anticipate the higher taxes needed in the future to
return to fiscal sustainability. If full Ricardian equivalence holds, this effect fully
compensates the fiscal expansion through reduced private demand.[34] Generally,
Ricardian equivalence is thought to be larger the more developed financial markets
are, and the less agents are liquidity-constrained. This makes it more relevant for
advanced rather than developing countries.

- Full Ricardian offset is also more likely if the fiscal policy change is believed to be
permanent, as households definitely anticipate the higher taxes in the future, whereas

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[33] See, for example, Baxter (1995), Cavallo (2005a), Corsetti and Müller (2006), Kim and Roubini (2004),
Obsfeld and Rogoff (1998).

[34] Bernheim (1987), Seater (1993).

a temporary fiscal policy change need not lead to any significant adjustment on a long-term horizon.[35]

- In addition, households may decide to respond to a fiscal expansion by increasing their labor supply, so as to increase their income (either because of lower taxes, or to pay for the anticipated fiscal adjustment). This, by increasing productivity, may foster private investment, thereby amplifying the initial fiscal policy effect.

- Another channel is through the real exchange rate: in a simple macro model, a fiscal expansion typically tends to appreciate the currency, thereby reducing net exports and generating an external deficit. But if the fiscal expansion also induces a rise in interest rates, this will reduce private investment (and, possibly, increase savings). However, if the fiscal policy leads to persistent real appreciation, the higher domestic returns on investment may boost investment. The final impact of these opposite effects on domestic demand and the external balance will depend on their relative strength.

70. **Output fluctuations, due to business cycles or productivity shocks, can also explain much of the divergence between external and fiscal balances.**[36] During a period of output growth (in the context of a business cycle or a productivity shock), one would expect a deterioration in the current account because of the high imports typically associated with increased investment outpacing savings. But simultaneously, the higher output is expected to improve the fiscal balance through higher tax receipts. Hence, the possibility of a "twin divergence."

B. The Empirical Evidence

71. **The empirical evidence of the twin deficits is mixed** (see Appendix for a summary of studies). Finding empirical evidence has proven elusive, since many factors other than fiscal policy play a significant role in determining the current account, and fiscal policy itself is in part endogenous. Thus, unsurprisingly, the few available studies reach different conclusions—both on the sign and the magnitude of the relationship. These studies use a wide variety of methods, from calibrated models to econometric analysis, for various periods and countries.

- General equilibrium models generally find a twin deficit relation—but a small one. The twin deficits arise because the models generally assume that the increase in labor

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[35] This is confirmed empirically by Ahmed (1986) for the U.K. between 1908–1980, a period that includes two large but temporary expenditure shocks due to wars.

[36] Baxter (1995), Kim and Roubini (2004).

supply resulting from the fiscal expansion raises the productivity of capital and hence, investment which, by raising demand, causes the current account to deteriorate. To a large extent, the presence and magnitude of the twin deficit relationship depends on the specific structure and calibration of the models—for example, the presence of non-Ricardian households (liquidity constrained or with finite life horizons).

- Econometric analysis using VAR techniques find varying results. These models generally identify fiscal shocks and trace their impact on the current account, controlling for sources of endogenous fiscal variations due to changes in output.

- Panel data analyses generally find a positive but small twin deficit relationship. These studies estimate large cross-country panels of the determinants of the current account, based on various theoretical foundations.

- Time-series single-equation estimates generally find evidence of a twin deficit relationship, but its magnitudes varies depending on the method used.

72.   **The various empirical programs all have their advantages and drawbacks— which helps explain the wide range of results.** *Single equation estimates* may not be able to disentangle the endogeneities involved, i.e., the Ricardian effects that are precisely at the core of the matter. In particular, it is far from assured that all the exogenous variables explaining trade or current account balances are independent from each other (simultaneity, multicollinearity). For example, the fiscal deficit and government consumption are not independent variables. Or fiscal policy may affect private sector credit demand through various channels, and these effects could possibly offset fiscal policy's direct impact on the current account. To some extent, however, generalized method of moments (GMM) techniques can overcome the endogeneity problem. *Panel data estimates* are subject to the same limitations, although the use of instrumental variables may help. *Dynamic general equilibrium models* may produce results that merely reflect their underlying assumptions, e.g., to what extent households have non-Ricardian characteristics. *VAR analyses* require long time series to yield reliable results, and remain subject to uncertainty regarding their economic interpretation.

73.   **An addition issue is that most empirical studies focus on medium- to long-term relationships.** They exclude important short-term determinants of current account balances, such as capital account developments (financing constraints, large changes in capital flows, or financial crisis) or terms-of-trade shocks, which may be essential in the case of emerging countries like Serbia.

74.   **Any econometric analysis faces significant limitations in Serbia due to the short time series available.** Reliable statistics are only available since around 2000, which also coincides with a structural break—the beginning of the political transition and the

reintegration in the international community. Thus, single equations estimated on an annual basis have too short a time span to yield robust results. This limitation may, to some extent, be overcome with the use of quarterly data, but such dataset is limited in the case of Serbia and it remains uncertain whether the available time frame is sufficient to conduct meaningful VAR analysis. Panel data analysis, by adding the information of other countries, may be more successful in a context of short time series, but results will only be valid in aggregate for the countries involved, and may not be directly applicable to Serbia itself.

75.   **Against this background, and given data limitations in Serbia, we will explore a limited number of avenues.** First, we will estimate single equations on quarterly observations as in Kanda (2006) for the current account. Because of the short time series available, only a quarterly frequency produces enough observations for a single equation. Second, we will estimate current account equations on annual panel data for several Southeastern European countries as in Bartolini and Lahiri (2006) and Bussière, Fratzscher, and Müller (2004). The large number of countries allows the use of annual data, although results will be valid for the sample as a whole and not specifically for Serbia. These approaches are the only practical ones given data limitations.

C. Current Account and Savings-Investment Balances in Serbia

76.   **Casual observation of Serbian data suggests the main driver of current account deficits is the nongovernment sector.** The level and change in the current account are both strongly correlated with the non-government (i.e., the private sector and public enterprises)[37] savings-investment balance (with correlation coefficients of 0.8 and 0.5, respectively, Table 1 and Figure 1).

Table 1. Serbia: Current Account, Fiscal, and Non-Government Balances, 2000-06
(In percent of GDP)

	2000	2001	2002	2003	2004	2005	2006	Correlation
External current account (underlying) 1/	-4.7	-7.4	-11.0	-9.3	-12.4	-10.9	-12.2	
Change	-0.6	-2.7	-3.6	1.7	-3.1	1.5	-1.4	
General government fiscal balance	-0.2	-1.0	-4.2	-3.0	0.0	0.7	-1.5	0.14
Change	1.4	-0.8	-3.1	1.2	3.0	0.8	-2.3	0.35
Non-government savings-investment balance	-1.5	-2.4	-3.9	-4.0	-10.2	-10.2	-10.0	0.83
Change	4.4	-0.9	-1.6	-0.1	-6.1	-0.1	0.2	0.47

Source: Serbian authorities, and IMF Staff Reports.

1/ Adjusted, in 2004 and 2005, for the introduction of the VAT in 2005.

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[37] Because national account data only allow a distinction between the general government and the other sectors, state- and socially owned enterprises are part of the nongovernment sector.

At the same time, changes in the fiscal balance are also positively correlated with changes in the fiscal balance (with a correlation coefficient of 0.35). In 5 out of 7 years, the current account responded in the expected direction to changes in the fiscal stance (Figure 2).

77. **However, identifying the twin deficits relationship requires isolating the impact of the fiscal from other developments.** The rapid growth in private demand, fueled by credit growth, has contributed significantly to widening current account deficits in Serbia, in addition to fiscal developments. Real exchange rate developments and terms of trade shocks also had an impact. Econometric analysis is therefore needed to separate the fiscal impact from other effects.

Figure 1. Serbia: Current Account, Fiscal, and Non-Government Balances, 2000–06
(In percent of GDP)
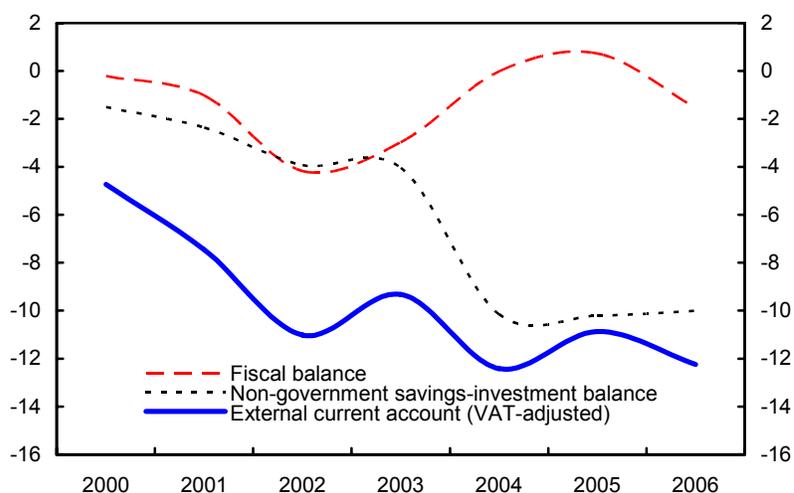
Sources: Serbian authorities, and IMF Staff Reports.

D. Single-Equation Estimates for Serbia

78. **We estimate the relationship between the current account and various plausible determinants, including fiscal variables.** The current account or the trade balance depend on domestic growth, terms of trade, the real effective exchange rate (REER), and domestic demand—represented by the fiscal balance and credit to nongovernment. This setup loosely follows Kanda (2006). We estimate a simple OLS equation using quarterly data for Serbia from 2000Q1 to 2007Q3, with all variables, except terms of trade and the REER, expressed in percent of nominal quarterly GDP.[38][39] The estimations are performed starting with several

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[38] We do not follow Kanda (2006) in using GMM estimates because of the lack of available well-founded instruments independent of the variables in play, acknowledging the associated statistical caveats.

[39] Unit root tests (augmented Dickey-Fuller) suggest absence of unit roots for all variables.

lags for each variable, eliminating the insignificant ones in turn, and keeping only the significant variables or those that improve the explanatory power of the regression.[40]

Figure 2. Serbia: Changes in Fiscal and External Current Account Balances, 2000–06
(In percent of GDP)
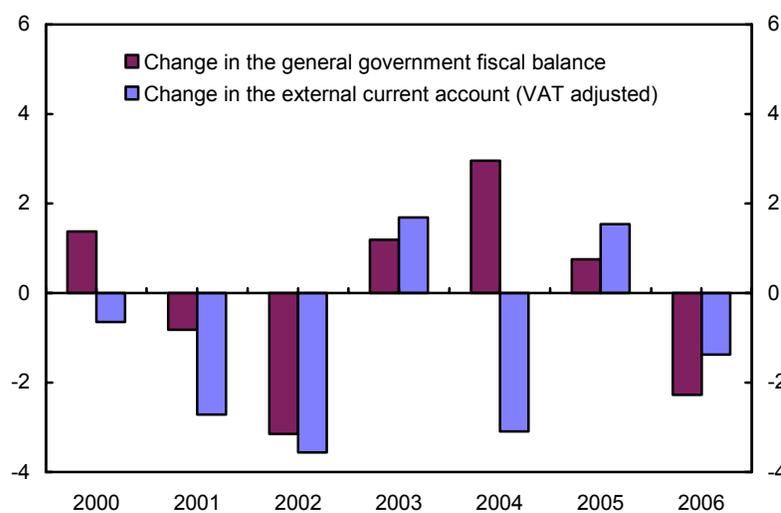
Sources: Serbian authorities, and IMF Staff Reports.

79.   **The impact of fiscal variables on the current account is found to be large and significant (Table 2).** The short-term elasticity of the current account to the *fiscal balance* is estimated at about 0.6 in the same quarter and another 0.5 in the following quarter (i.e., an increase in the fiscal deficit by 1 percentage point of GDP widens the current account deficit by about 1.1 percent of GDP after two quarters)(Equation 1).[41] Decomposing government expenditure and revenue, the elasticity of the current account to *government expenditure* is large (about −1) and acts over three quarters (-0.38, −0.26, and −0.38), with an increase in expenditure reducing the current account balance. *Government revenue* also has a strong impact (about 0.5) after two quarters.

80.   **Other variables such as domestic credit, economic activity, terms of trade, and the real effective exchange rate, also have a significant impact on the current account.** Credit to nongovernment is found to affect negatively the current account over several

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[40] The source for these series is IMF staff, based on official data. A second, broader, definition of the fiscal balance and credit to nongovernment (Table 2, Equation 2) includes amortization of frozen foreign currency deposits (FFCDs) as expenditure and nonbank external borrowing as credit, respectively.

[41] Using the second definition of variables (Equation 2), the elasticity is smaller but remains at a high 0.5, and the effect is only contemporaneous. The smaller fiscal impact may result from a smaller effect of the amortization of FFCDs on demand than other components of public expenditure.

quarters, with an elasticity between –0.8 to –1.3. Economic growth first has a negative impact on the current account (due to higher demand and lower savings) but later on has a positive impact (due to higher net exports and savings). Real appreciation is associated with a deterioration in the current account balance, as expected. The impact of terms of trade is less clear: in one specification an improvement in terms of trade benefits the current account (after a lag), while in the other, the immediate improvement is followed by a deterioration, possibly due to increased demand.

Table 2. Serbia: Fiscal Policy and the Current Account, 2000-07

Dependent variable	Current account		
Explanatory variables	(1)	(2)	(3)
Fiscal balance (excl. grants)	0.57**	0.50**	
	(0.22)	(0.21)	
Fiscal balance (lagged 1 quarter)	0.50**		
	(0.24)		
Gov. expenditure			-0.38***
			(0.11)
Gov. expenditure (lagged 1 quarter)			-0.26**
			(0.11)
Gov. expenditure (lagged 2 quarters)			-0.38*
			(0.19)
Gov. revenue (lagged 2 quarters)			0.53**
			(0.23)
Credit to non-government		-0.32**	
		(0.13)	
Credit to non-government (1Q lag)	-0.75***		-0.60**
	(0.24)		(0.23)
Credit to non-government (2Q lag)	-0.58***	-0.50***	-0.67**
	(0.21)	(0.12)	(0.26)
Change in trend GDP	-3.18***	-1.56**	-3.15***
	(0.57)	(0.60)	(0.54)
Change in trend GDP (1Q lag)	-1.18**		
	(0.54)		
Change in trend GDP (2Q lag)		2.28***	
		(0.73)	
Terms of trade		0.54**	
		(0.25)	
Terms of trade (1Q lag)		-0.78***	
		(0.25)	
Terms of trade (2Q lag)	0.21**		
	(0.08)		
Real effective exchange rate	-0.11***		
	(0.04)		
Real effective exchange rate (1Q lag)			
Real effective exchange rate (2Q lag)			
Dummy for Q1			
Dummy for Q2	3.33**	6.17***	6.22***
	(1.26)	(1.23)	(1.31)
Dummy for Q3	5.47***	6.52***	7.02***
	(1.32)	(1.09)	(1.18)
Constant			18.36**
			(7.94)
Number of observations	29	29	29
R-squared (adjusted)	0.76	0.75	0.72

Source: IMF Staff calculations.

Notes: OLS estimation. Sample 2000Q1-2007Q3. Variables in percent of quarterly GDP, except REER and terms of trade. Current account excluding grants, corrected for the VAT introduction in January 2005. The symbols ***, **, and * denote significance at 1, 5, and 10 percent. Standard deviations are in parenthesis.

Specification (2) includes amortization of FFCDs as expenditure, and nonbank external borrowing as credit.

E.   Panel Data Estimates for European Countries

81.   **The current account in Eastern European countries experiencing economic transition is likely to be driven by more factors than fiscal variables—for example investment.** The transformation and convergence process of the transition economies was associated with large and persistent current account deficits, led in part by high investment and consumption. In this context, the fiscal stance may be insignificant—although one would expect it to have some impact at the margin.[42]

82.   **We test for the presence of a twin deficit relationship in Eastern and Southeastern Europe (ESEE) in transition.** We reproduce the study by Bartolini and Lahiri (2006), based on Bernheim (1987), with annual data for 15 Eastern and Southeastern European countries over the period 1995–2006.[43] This involves two steps. First, an analysis of the response of private consumption to changes in the fiscal balance, so as to assess the degree to which Ricardian effects may compensate for the direct expansionary impact of, say, an increase in the fiscal deficit. The model specification controls for public consumption (because the latter may be a substitute for private consumption), public debt (because high debt may increase private savings), economic and population growth (because these variables are traditionally associated with consumption behavior). Second, an estimate of the response of the current account to changes in the fiscal balance, using the same variables. By using the same specification, one sees whether investment responds to changes in fiscal policy, or whether changes in private consumption translate directly into changes in the current account.

83.   **Results do not suggest the presence of twin deficit relationships in ESEE countries (Table 3).** In the baseline specification with fixed effects, an increase in the deficit (without change in public consumption, i.e., through a tax cut) reduces private consumption and improves the current account balance (by 0.18), which suggests a "twin divergence" with completely Ricardian agents (Column 2). However, an increase in public consumption (financed by an increase in taxes) reduces private consumption and worsens the current account (by 0.44). Hence, a deficit-financed increase in public spending would worsen the current account by only 0.26. The behavior of private consumption also suggests strong

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[42] Teferra and Mottu (2006) show that the large current accounts in Eastern European countries were associated with high investment. See also McGettigan (2000).

[43] The countries are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Moldova, Romania, Serbia, Slovak Republic, Slovenia, Poland, Ukraine, and Turkey.

Ricardian effects, with a tax cut actually reducing private consumption (Column 1). More conventionally, though, public and private consumption seem to be close substitutes.[44]

Table 3. Eastern and Southeastern Europe: Fiscal Policy and the Current Account, 2000-07

Dependent variable	Private Consumption	Current account		
Explanatory variables	(1)	(2)	(3)	(4)
Gen. Gov. Fiscal balance	**0.29*****	**-0.18***	**-0.52*****	
	(0.11)	(0.10)	(0.17)	
Gen. Gov. Fiscal balance (lagged)			**0.44****	**0.20***
			(0.21)	(0.13)
Public consumption	-0.82***	-0.44**	-0.63***	-0.50***
	(0.25)	(0.19)	(0.18)	(0.13)
Real GDP growth	-0.14*	0.32***	0.32***	0.33***
	(0.07)	(0.06)	(0.06)	(0.07)
Population growth	-0.83**	-0.49	-0.46	-0.32
	(0.40)	(0.36)	(0.39)	(0.25)
Gen. Gov. Debt	-0.01	0.05***	0.06***	0.03**
	(0.03)	(0.02)	(0.02)	(0.01)
Gross capital formation				**-0.54*****
				(0.04)
Memorandum items:				
Fiscal balance-increasing policies:				
Tax increase	0.29	-0.18	-0.08	0.20
Expenditure cuts	1.11	0.26	0.55	0.70
Fiscal balance-neutral policy:				
Expenditure cuts with tax cuts	0.82	0.44	0.63	0.50
Countries	15	15	15	15
Number of observations	152	152	145	145
R-squared (adjusted)	0.91	0.66	0.72	0.77

Source: IMF Staff calculations.

Notes: Panel fixed effects estimation. Sample 1995-20062. Data source: IMF WEO database. Variables in percent of GDP or in percent. The symbols ***, **, and * denote significance at 1, 5, and 10 percent. Standard deviations are in parenthesis.

84. **However, changing the specification confirms the prominence of investment as the driver of current account developments and uncovers a twin deficits relationship.** Introducing the lag of the fiscal balance in the estimation restores a twin deficit relationship in the second year (Column 3). Introducing gross capital formation also suggests a lagged twin deficit relation, and shows investment as a strong and significant determinant of the

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[44] Unit root tests suggest the absence of unit roots. The Hausman specification test supports the fixed effects specification against random effects.

current account deficit (Column 4). Controlling for other short-term shocks to the current account, such as terms-of-trade shocks, does not affect results significantly.

F. Conclusions

85.   **We find that the fiscal balance has a strong and significant impact on the current account in Serbia**, controlling for other macroeconomic variables, including bank credit, growth, the real exchange rate, and terms of trade. The impact is found to be large and significant, with elasticity estimates between 0.5 and 1.1. In the baseline specification, an increase in the fiscal deficit by 1 percent of GDP widens the current account deficit by 0.6 percent of GDP in the same quarter and by 0.5 percent of GDP in the following quarter. Decomposing between government revenue and expenditure, the former acts with a two-quarter lag, while the latter acts both immediately and with lags. Bank credit is also found to have a significant (negative) impact on the current account.

86.   **On the other hand, evidence of a twin deficits relationship is more elusive for a panel of Eastern and Southeastern European countries.** This may reflect, during the transition process, strong Ricardian effects (fiscal consolidation allowing economic agents to reduce their savings) and the overwhelming effect of domestic investment in causing large and persistent current account deficits (as shown, for example, in Teferra and Mottu, 2006). Country studies may help assess specific circumstances explaining the weak twin deficits relationship in the region.

87.   **The limitations of the empirical results should be noted.** First, the data series are relatively short for Serbia, making any econometric estimate far from robust. Second, different specifications of the key variables yield results that are quite different in size, if not in direction. Third, it is far from assured that all the exogenous variables explaining trade or current account balances are independent from each other (multicollinearity). In other words, fiscal policy, for example, may affect private sector credit demand. Thus, the results should be interpreted with the appropriate caution, especially for forecasting and policymaking purposes.

Appendix: Summary of Empirical Studies

General equilibrium models

- Baxter (1995), using a DGE-real business cycle model calibrated for the U.S., finds that a persistent change in the fiscal stance (through changes in either government expenditure or taxes) has a 0.5 elasticity on the current account. A tax cut that is only temporary has little effect, because its effect on investment is minimal—the tax cut will be phased out once the capital is in place.

- Erceg, Guerrieri, and Gust (2005), using a DGE model calibrated for the U.S. and assuming that some households are non-Ricardian, find that a increase in the fiscal deficit (either through expenditure or taxes) generates a trade deficit with an elasticity of less than 0.2. This low value is mainly due to low price elasticities of export and import demand— thus, the real appreciation that follows the fiscal expansion does not induce a strong shift in net exports.

- Kumhof and Laxton (2007), using a DGE model for the U.S., find that the current account reacts with an elasticity of about 0.6–1 to a permanent fiscal shock after about 5 years. Their model incorporates more significant non-Ricardian features, which explains the relatively high estimates.

- Finally, Cavallo (2005b), also using a DGE model calibrated for the U.S., finds that the composition of government expenditure matters for its impact on the current account. While the elasticity of the current account to expenditure on final goods is 0.5, its elasticity to expenditure on wages is ten times smaller (only 0.05), since the latter has no direct impact on imports.

VAR estimates

- Kim and Roubini (2004), using a VAR approach for the U.S. for 1973–2004, find that surprisingly, fiscal expansions are associated with an *improvement* in the current account, because the drop in investment caused by the rise in interest rates (due to the fiscal expansion) is significant and reinforces the Ricardian effects. See also Müller (2004) for a similar analysis.

- Corsetti and Müller (2006), expanding the previous approach to 4 large advanced economies between 1980–2004, find that the existence and magnitude of the twin deficits depend on the degree of economic openness and the persistence of the fiscal shocks. The latter effect is because the lasting terms-of-trade appreciation raises the return on investment, causing investment to rise (counteracting the drop in investment due to the rise in interest rates). Hence, in economies rather closed with non-persistent fiscal shocks, such as the U.S.

and Australia, the impact of fiscal policy on the current account is rather limited, while it is more significant in countries such as Canada and the U.K.

- Blanchard and Perotti (2002) and Perotti (2006), apply the same techniques to quantify the impact of fiscal policy on output.

Panel data analyses

- Bartolini and Lahiri (2006), reproducing a study by Bernheim (1987), use a panel regression technique with fixed effects to estimate the link between fiscal and current account balances, controlling for government consumption, public debt, GDP growth, and population growth. For a group of 26 advanced and emerging countries between 1972–98 and for 18 OECD countries between 1972–2003, they find an elasticity of 0.38 and 0.30, respectively, between the current account and the fiscal balance. Because of the inclusion of government consumption as a control variable, this represents the sensitivity to a change in taxes. A change in government consumption financed by an increase in the fiscal deficit would have a larger effect, 0.71, in the first sample but a small one, 0.07 in the second sample.

- Bussière, Fratzscher, and Müller (2004) estimate an intertemporal model of the current account—where consumption is smoothed over time by lending or borrowing abroad—on a panel of advanced OECD and EU accession countries for the periods 1980-2002 and 1995-2002, respectively. Using various dynamic panel estimation methods (fixed effects, instrumental variables, and generalized method of moments), they find that the elasticity of the current account to the fiscal balance is between 0.06 and 0.25, controlling for growth and convergence indicators (relative income, investment, and public spending).

- Applying a similar setup for Bulgaria and Romania, Duenwald, Gueorguiev, and Schaechter (2005) find the elasticity of the trade balance to the lagged fiscal balance to be 0.2, using quarterly data from 1999–2004. They also find that the elasticity to lagged credit flows is −0.4 for Bulgaria and −0.7 for Romania.

- In a further study, the same Bussière, Fratzscher, and Müller (2005) expand the model to include both global and country-specific productivity shocks. Using panel and country-specific regressions for a large sample of OECD countries from 1960–2003, they find an elasticity lower than 0.1 between the current account and the fiscal balance. In this setting, productivity shocks are prominent in the determination of the current account.

- Funke and Nickel (2006) estimate the impact of government expenditure on imports in advanced economies. Using panel data estimates on annual data from 1970–2002 for the G-7 countries, they find that the elasticity of imports of goods and imports of services with respect to changes in government expenditure is 0.4 and 0.5, respectively—controlling for private consumption, investment, and relative price effects.

- Finally, in a study that incorporates a large sample of *developing* countries from 1971–95, Chinn and Prasad (2003), using panel regressions, estimate the long-run elasticity of changes in the current account to changes in the fiscal balance to be about 0.4, while the elasticity in advanced economies is found to be smaller and not significant. This relatively high elasticity for developing countries is consistent with the existence of smaller Ricardian effects, possibly due to greater liquidity constraints and less developed financial markets in those countries.

Time-series single-equation estimates

- Bagnai (2006) estimates a long-run cointegration relation between the current account and the fiscal balance, controlling for private investment, separately for each of 22 OECD countries over the period 1960–2005. The identification of structural breaks improves the statistical significance of the results. The presence of a twin deficit relationship is ruled out in half of the countries while for the other half, the long-run elasticity between the current account and the fiscal balance is 0.4 on average.

- Kanda (2006) estimates the determinants of the trade balance in Bosnia and Herzegovina using the generalized method of moments on quarterly data for 1998–2005 and finds the expected relationships to be relatively large and significant. The elasticity of the trade balance to fiscal expenditure and fiscal revenue (lagged two quarters) is estimated at –0.45 and 0.39, respectively. Other determinants of the trade balance, credit flows to enterprises and to households, have an elasticity of –0.21 and –1.08, respectively.

- Finally, Obstfeld and Rogoff (1996, p. 144) estimate a simple cross-country equation relating the current account and the fiscal balance of 19 OECD countries (on average over 1981–86). They find a large and significant coefficient of 0.78, but warn that such unsophisticated approach should not be given too much weight, as it omits important variables that affect the current account.

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VI. A FORECASTING AND MONETARY POLICY ANALYSIS MODEL FOR SERBIA[45]

> **Objective:** To implement and calibrate a simple macroeconomic model for Serbia—widely used by IMF staff—and use it for policy analysis.
>
> **Main results:** The model is broadly able to reproduce recent economic and policy developments in Serbia. It can be used to forecast the reaction of inflation, growth, and the exchange rate to various exogenous shocks (e.g., exchange rate, interest rate, oil price, fiscal, and foreign demand shocks) given the endogenous reaction of monetary policy on interest rates.
>
> **Policy implications:** The model helps central banks forecast the main macroeconomic variables and make interest rate decisions in an inflation targeting framework.

A. Introduction

88.   The model—the so-called Forecasting and Policy Analysis System (FPAS) set up by IMF staff—is a simple macroeconomic framework that allows to forecast monetary variables and analyze monetary policy actions and shocks in an inflation targeting regime with a flexible exchange rate.[46] It focuses on the short- and medium-term interaction between monetary policy and output, inflation, and the exchange rate. The model combines the New Keynesian synthesis, which emphasizes nominal and real rigidities and the role of aggregate demand in output determination, with methods of dynamic stochastic general equilibrium modeling with rational expectations. Specifically, it consists of an aggregate demand equation, a price-setting equation, an uncovered interest parity condition for the exchange rate, and a monetary policy reaction function relating the policy interest rate to output and inflation. Thus, the model embodies the principle that the role of monetary policy is to provide an anchor for inflation and inflation expectations.

89.   The model, and variations thereof, has been used by IMF staff teams and by central banks in various advanced and emerging countries over the past few years.[47] Here, the model

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[46] The FPAS model was developed by Berg, Karam, and Laxton (2006a, 2006b), hereafter referred to as BKL. See also Beneš and al. (2003). On theoretical foundations, see the references in the above-mentioned papers, and Clarida, Galí, and Gertler (1999, 2001). Published applications by IMF staff include Harjes and Ricci (2005) and Epstein and al. (2006).

[47] A simplified version, excluding the output gap equation, has been developed by the National Bank of Serbia (NBS, 2007, Appendix 2).

is adapted to Serbia by calibrating the parameter values to the characteristics of the Serbian economy and monetary policy-making. Because of the numerous structural changes in the past years in Serbia and the short data series, parameters are not estimated econometrically. Instead, plausible parameter values, based on a variety of sources, are tried and adjusted in an iterative process until the model displays reasonable properties and appropriately replicates recent developments and forecasts.

90.   Because it is simple enough to allow for full comprehension of the interactions between variables, the framework is useful to analyze and communicate monetary actions. Of course, simplicity has its drawbacks in that many issues (importantly, the current account) are outside the scope of the model. Moreover, the model essentially considers deviations from equilibrium values and, thus, does not explain those equilibrium values.

91.   The model is used here for several purposes—forecasting, analysis of policy alternatives, and risk assessment. First, the model helps assess the consistency of baseline forecasts (e.g., those of the authorities or of IMF staff) and how much they deviate from the model-based forecast. Second, it is used to simulate alternative policy actions and assess their impact. And third, it can simulate exogenous shocks and analyze the effect of policy responses to those shocks. More generally, the model helps organize policy analysis by pointing to the essential linkages between economic variables and policy actions, and by providing quantitative projections of those variables and policies.

B. The Model

92.   The model consists essentially of four equations: (i) an aggregate demand or output gap equation (IS curve) relating real activity to expected and past real activity, the real interest rate, the real exchange rate, and foreign activity; (ii) a price-setting equation (Philips curve) relating inflation to past and expected inflation, the output gap, the real exchange rate, and the price of oil; (iii) an uncovered interest rate parity condition to determine the real exchange rate; and (iv) a monetary policy rule for setting the policy interest rate as a function of real activity and expected inflation. In addition, to allow for a different impact of oil prices on headline and core inflation, the model is augmented with a second price-setting equation for core inflation that does not depend directly on oil prices, but nevertheless incorporates a lagged effect of headline inflation on core inflation. There are two sets of equations, one for the home country (Serbia), the other for the foreign country (the euro area).

93.   The output gap equation is as follows, with the gap terms measured as deviations of actual values from trend. All variables are quarterly (see Appendix I for a complete definition of variables):

$$ygap_t = \beta_{ld}ygap_{t+1} + \beta_{lag}ygap_{t-1} - \beta_{RRgap}RRgap_{t-1} + \beta_{zgap}zgap_{t-1} + \beta^{EA}_{ygap}ygap^{EA}_t$$
$$- \beta_{RRgapEA}RRgap^{EA}_{t-1} + \varepsilon^{ygap}_t$$

with:

$$RRgap^{EA} = RR^{EA}(1 + ResReq^{Serbia}) - RR^{Serbia*}$$

where *ygap* is the output gap, *RRgap* the real interest rate gap, *zgap* the real exchange rate gap (expressed as a real depreciation), $ygap^{EA}$ the output gap in the euro area, β a series of parameters attached to those variables, and ε^{ygap} is an error term. In words, this equation means that the output gap in time t is a function of its expected value in the next period, its lagged value in the previous period, the real interest rate (lagged, negatively), the real depreciation (lagged, positively), the foreign country's output gap (external demand), the effective foreign real interest rate (augmented by the cost of reserve requirements, lagged, negatively), and a disturbance term.

94.   The variable $RRgap^{EA}$ is added to the original BKL model to capture the fact that high euroization of credit activity in Serbia makes real activity depend not only on domestic real interest rates, but also, and perhaps mainly, on euro interest rates RR^{EA}. However, the euro interest rate is raised by the cost of foreign currency reserve requirements $ResReq^{Serbia}$. It should be noted that this gap term is calculated relative to the long-term Serbian real interest rate, implying that similarly to the domestic real interest rate, the effective foreign real interest rate will have an expansionary effect on activity only if it is lower than the domestic long-term steady-state real interest rate.

95.   The price-setting equations are as follows. For headline inflation:

$$\pi_t = \alpha_{\pi ld}\, \pi 4_{t+4} + (1 - \alpha_{\pi ld})\, \pi 4_{t-1} + \alpha_{ygap} ygap_{t-1} + \alpha_z\, (z_t - z_{t-1}) + \alpha_0 \pi_{rpoil,t} + \alpha_1 \pi_{rpoil,t-1} + \varepsilon_t^{\pi}$$

where $\pi 4_{t+4}$ is the four-quarter ahead y-o-y inflation rate, $\pi 4_{t-4}$ the four-quarter lagged y-o-y inflation rate, *ygap* the output gap, $z_t - z_{t-1}$ the real depreciation, $\pi_{rpoil,t}$ the change in the relative price of oil, α are parameters, and ε^{π} is an error term. In words, this equation means that inflation is a function of expected inflation, lagged inflation, the lagged output gap, real depreciation, oil price changes, and a disturbance term.

96.   For core inflation:

$$\pi_{c,t} = \alpha_{c,\pi ld}\, \pi 4_{c,t+4} + (1 - \alpha_{c,\pi ld})\, \pi 4_{c,t-1} + \alpha_{c,ygap} ygap_{t-1} + \alpha_{c,z}\, (z_t - z_{t-1}) + \alpha_{c,3}(\pi 4_{t-1} - \pi 4_{c,t-1}) + \varepsilon_t^{\pi c}$$

where π_c stands for core inflation. The last term represents the difference between headline and core inflation, allowing, for example, some pass-through from oil prices into core inflation.

97.   The real exchange rate equation is:

$$z_t = z^e_{t+1} - (RR_t - RR^{EA}_t - \rho_t^{*}) / 4 + \varepsilon_t^{z}$$

where z is the real exchange rate (in increase represents a depreciation), z^e the expected real exchange rate, RR the real interest rate, RR^{US} the real interest rate in the euro area, ρ^{*} the equilibrium risk premium on the domestic currency, δ are parameters, and ε^z is an error term.

This equation is a traditional uncovered interest rate parity condition: the real exchange rate is a function of the expected real exchange rate and the real interest rate differential (corrected for the currency risk premium), and a disturbance term.

98.   The expected real exchange rate is defined as:

$$z^e_{t+1} = \delta_z z_{t+1} + (1 - \delta_z) z_{t-1}$$

where the first term is the future exchange rate rationally consistent with the model's expectation, and the second term is a backward-looking component.

99.   Finally, the monetary policy rule is:

$$RS_t = \gamma_{RSlag} RS_{t-1} + (1 - \gamma_{RSlag}) [RR_t^* + \pi 4_t + \gamma_\pi (0.9\ \pi 4_{c,t+4} + 0.1\ \pi 4_{t+4} - \pi^*_{t+4}) + \gamma_{ygap} ygap_t]$$
$$+ \varepsilon_t^{RS}$$

where RS is the nominal interest rate, RR^* the equilibrium real interest rate, π^* the inflation target, γ are parameters, and ε^{RS} is an error term. This equation means that the nominal interest rate is set depending on its lagged value, the equilibrium real interest rate, current inflation, the deviation of four-quarter ahead y-o-y inflation from its four-quarter ahead target, the output gap, and a disturbance term. We assume that the central bank targets core inflation for 90 percent, and only 10 percent headline inflation.

100.   The model is a two-country model where the home country is small and open whereas the foreign country—the home country's main trading partner—is relatively large and closed, in effect exogenous to the home country. Thus, the foreign country enters the home country equations through (i) the impact of its activity on the home country demand and (ii) the impact of its real interest rate on the bilateral exchange rate. Conversely, the home country does not impact the foreign country, which implies that the output gap of the foreign country does not depend on the bilateral exchange rate or the home country activity; and foreign country inflation does not depend on the bilateral exchange rate. Hence, the uncovered interest rate parity condition is irrelevant for the foreign country model.

101.   The supply side of the model is extremely simplified. Potential output is given outside the model (either by inference from past data, or from other assumptions). The only complication introduced is that potential output growth is made to depend not only on long-run potential growth, but also on changes in oil prices. This allows to replicate the impact of oil shocks on potential output, assuming that oil is an input in the production of goods and services. The potential output equation is:

$$400\ (y^*_t - y^*_{t-1}) = g^*_t - \upsilon_{rpoil} \pi 4_{rpoil,t} + \varepsilon_t^{y^*}$$

where y^* is potential output, g^* the long-term growth rate of potential output, $\pi 4_{rpoil,t}$ the four-quarter change in the relative price of oil, υ a parameter, and ε^{y^*} an error term. In words, the

equation means that the current growth rate of potential output is equal to its long-term growth rate minus a function of the change in the relative price of oil, and a disturbance term.

C. Implementing the Model

102.   The model is implemented using Serbia and Euro Area data and parameters. Historical data are quarterly from 1999q1 to 2007q4, and baseline forecasts run from 2008q1 to 2012q4. The model also requires choosing long-run steady-state values for the main variables. The euro area is Serbia's main trading partner, and the dinar-euro exchange rate is, in effect, the main exchange rate used in Serbia. Euroization of deposits, loans (including through euro-indexation of loans) and, to some extent, transactions is high. Thus, the model parameters for Serbia are calibrated to capture the high pass-through of the exchange rate to domestic prices. In addition, the monetary policy reaction function takes into account that the NBS targets core inflation. For the euro area, parameter values were taken from IMF staff applications of the same model. Appendix II provides greater details on data.

103.   There is little consensus on a measure of the output gap in Serbia. Given the short history of transition, potential output is difficult to estimate, both for the past and for the future, and actual output has fluctuated widely. For the purpose of the model, we calculate the output gap as the difference between the trend-cycle component of the seasonally adjusted GDP series and the Hodrick-Prescott filtered GDP series. This minimizes excessive fluctuations, and ensures that the output gap is positive during most of the recent quarters and the short-term projection period, thereby providing an inflationary impulse.

Parameter Values for Serbia

104.   The parameter values are chosen based on the modeling experience of other similar country models, but adapted to our priors regarding the characteristics of the Serbian economy and policy-making (Table 1). We follow an iterative process whereby the parameter values are changed, one at a time, until the residuals in the model (i.e., the difference between the historical data series and those calculated by the model), which correspond to the "judgment" added to the model, are broadly minimized in recent years. However, we do not expect these residuals to be zero: first because the model is too simplified to capture all the idiosyncrasies and shocks of recent economic developments in Serbia; and second because a "regime change" occurred in mid-2006 with the beginning of the transition toward an inflation targeting framework.

105.   The β parameters in the output gap equation depend to a large extent on the degree of inertia in the economy, the effectiveness of monetary policy transmission, and the openness of the economy.

- Drawing on the experience of several applied country modeling efforts, Berg, Karam, and Laxton (2006b) suggest that the value of β_{lag} will lie between 0.5 and 0.9, with a lower value for less mature economies more susceptible to volatility. For Serbia, we

choose a low value of 0.5 (somewhat smaller than in the euro area) to take account of the emerging and volatile nature of the Serbian economy.

- The lead of the output gap (β_{ld}) is typically small, between 0.05 and 0.15, and we choose a value at the mid-point of that range for Serbia.

- The parameters β_{zgap} and β^{EA}_{ygap} depend mainly on the importance of the exchange rate channel and the degree of openness. We choose a high value for β_{zgap} to reflect the importance of the exchange rate channel and a low value for β^{EA}_{ygap} due to Serbia's relatively modest openness.

- The parameter β_{RRgap} depends traditionally on the effectiveness of the monetary transmission mechanism. In the Serbian context, however, the two parameters β_{RRgap} and $\beta_{RRgapEA}$, which reflect the impact of dinar and foreign interest rates on domestic activity, respectively, depend largely on the degree of euroization. The first parameter is set relatively low and the second one relatively high to reflect the weak dinar interest rate channel and the predominance of foreign interest rates (augmented by the effect of reserve requirements) in the context of a highly euroized economy

106.   The α parameters in the inflation equations depend on the role of expectations and aggregate demand on inflation, and the pass-through from the exchange rate to prices.

- The $\alpha_{\pi ld}$ parameter in the headline inflation equation determines the forward component of inflation (while its inverse $1 - \alpha_{\pi ld}$ determines the backward component). This can be interpreted as depending in part on the credibility of the central bank, and in part on institutional arrangements regarding wage indexation and other price-setting mechanisms. A higher value of $\alpha_{\pi ld}$ close to 1 involves a "speedboat" economy where small changes in monetary policy cause large changes in price expectations, while a low value involves an "aircraft carrier" economy where inertia and backward-looking expectations cause prices to respond with greater delays to changes in monetary policy. In this context, BKL propose values of $\alpha_{\pi ld}$ significantly lower than 0.5. We choose a relatively high value of 0.3 (slightly higher than in the euro area), involving a rather low inflation inertia, to reflect the fact that indexation is not complete in Serbia (in the recent past, public and private sector wages have generally been set with respect to the authorities' announced inflation objectives) and the assumption that the new inflation targeting regime is somewhat credible.

Table 1: FPAS Model Parameters 1/

	Range Lower	Range Upper	Serbia	Euro Area	Czech Rep.	Hungary	Poland	Romania	Bolivia	Brazil	Colombia	Mexico	Peru	Canada	U.S.	Israel	South Africa
Output gap (Beta)																	
Lagged output gap	0.5	0.9	0.50	0.60	0.60	0.85	0.40	0.75	0.80	0.80	0.85	0.70	0.65	0.85	0.85	0.60	0.50
Lead output gap	0.05	0.15	0.10	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.10	0.05	0.05	0.10	0.10	0.10	0.05
Lagged real interest gap			0.02	0.15	0.10	0.10	0.05	0.10	0.08	0.08	0.15	0.075	0.17	0.10	0.10	0.15	0.12
Lagged real exchange rate gap	Sum 0.1	Sum 0.3	0.08	...	0.10	0.05	0.05	0.02	0.04	0.02	0.06	0.03	0.04	0.05	...	0.05	0.05
Foreign activity			0.10	...	...	0.25	0.15	0.15	0.05	0.05	0.10	0.25	0.01	0.25	...	...	0.25
Lagged foreign real interest rate gap			0.10	...	...	...	...	...	...		...	...	...	...	...	...	...
Headline inflation (Alpha)																	
Lead inflation	0	1.0	0.30	0.20	0.20	0.20	0.15	0.25	0.20	0.20	0.20	0.35	0.30	0.20	0.20	0.10	0.25
Lagged output gap	0.25	0.5	0.25	0.30	0.30	0.30	0.25	0.30	0.25	0.26	0.25	0.20	0.30	0.30	0.30	0.30	0.50
Real exchange rate change			0.30	...	0.10	0.10	0.06	0.08	0.20	0.04	0.10	0.15	0.10	0.10	...	0.23	0.15
Real oil price change			0.030	0.004		0.005			0.00		0.003	0.001	0.001	0.005	0.006		
Lagged real oil price change			0.030	0.004		0.005			0.00		0.003	0.001	0.001	0.005	0.006		
Core inflation (Alpha)																	
Lead inflation	0	1.0	0.40	0.20	0.20		0.10	0.25	0.20	0.20	0.20	0.35	0.30	0.20	0.20	0.10	
Lagged output gap	0.25	0.5	0.25	0.30	0.30		0.25	0.30	0.25	0.26	0.25	0.20	0.30	0.30	0.30	0.30	
Real exchange rate change			0.35	...	0.10		0.06	0.08	0.20	0.04	0.10	0.05	0.10	0.033	...	0.23	
Lagged difference headline - core			0.25	0.25	0.25		0.06	0.25	0.25	0.30	0.30	0.25	0.05	0.25	0.25	0.05	
Monetary policy rule (Gamma)																	
Lagged interest rate	>0.5	1.0	0.5	0.5	0.5	0.5	0.5	0.4	0.7	0.8	0.3	0.75	0.7	0.5	0.5	0.5	0.5
Forward headline inflation gap	>0	5.0	2.0	2.0	2.0	2.0	2.0	2.5	2.0	1.5	2.5	2.69	2.5	2.0	2.0	2.5	2.0
Output gap	>0		0.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5	0.3	0.75	0.5	0.5	0.5	0.5	0.5
Uncovered interest parity (Delta)																	
Lead bilateral exchange rate	>0	1.0	0.40	...	0.40	0.30	0.40	0.15	0.40	0.50	0.50	0.50	0.40	0.50	...	0.25	1.0
Impact of oil on potential output (Nu)			0.016	0.016										0.008	0.016		
Long run equilibrium values																	
Inflation target			4.0	2.0	3.0				4.0				2.5	2.0	2.5	2.0	5.0
Potential output growth			5.5	2.0	4.0				4.0				4.5	3.0	3.0	4.0	3.5
Real interest rate			4.0	2.0	1.5				5.0				4.0	2.5	2.25	3.25	4.0

Source: IMF staff.

1/ Indicative parameters of initial models. Current country models may differ.

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- The α_{ygap} parameter depends on the extent to which output responds to price changes and, conversely, how much inflation is influenced by real demand pressures, and is typically between 0.25–0.50. This parameter ultimately depends on the "sacrifice ratio," i.e., the loss of output necessary to bring down inflation. We set it at a low value of 0.25 to suggest that inflation is not primarily driven by real demand pressures. Nevertheless, the nonzero value insures that the model will consider some inflationary impact of expansionary fiscal policies.

- The α_z parameter represents the short-term pass-through of (real) exchange rate movements into prices, and depends on trade openness, price competition, and monetary policy credibility. In the case of Serbia, the high degree of euroization and the high exchange rate pass-through (at least historically) lead us to choose a relatively high value of 0.3 for that parameter.

- Finally, the parameters related to the responsiveness of inflation to oil prices depend on the share of oil and oil-related products in the CPI, which is high in Serbia relative to other countries.

107.   The α parameters are the same for the core inflation equation, except that we set $\alpha_{c,\pi ld}$ and $\alpha_{c,z}$ slightly higher to reflect a stronger forward-looking component for core inflation (since the central bank is targeting core inflation) and a greater exchange rate pass-through into core inflation, respectively. The parameter $\alpha_{c,3}$ relating core to headline inflation is set at 0.25, in line with other country models.

108.   The δ parameter in the real exchange rate equation determines the relative importance of forward- and backward-looking real exchange rate expectations. If δ is equal to 1, the equation behaves as in the Dornbusch overshooting model, i.e., the real exchange rate is a function of the future sum of all real interest rate differentials. This makes monetary policy a very effective tool. BKL, however, note that it may be imprudent to rely on such effective forward-looking linkages in the face of considerable uncertainty, and recommend choosing a parameter value lower than 0.5, which is what we do (we choose 0.4). Finally, note that the coefficient relating the real exchange rate and the real interest rate differential (adjusted for the risk premium) is unity, which assumes that rational arbitrage makes the uncovered interest parity condition hold.

109.   The γ parameters in the monetary policy rule equation depend on the speed and aggressiveness with which the monetary authorities adjust the nominal interest rate, and the relative importance of the inflation target versus the real activity target.

- Usually, the central bank cannot abstract from paying some attention to real activity even in a "pure" inflation targeting framework and, thus, the γ_{ygap} will be greater than zero (we choose a value of 0.5, in line with other countries).[48]

- We choose a value of 2.0 for γ_π (in line with other country models with values between 2.0–2.7), which ensures relatively large interest rate interventions to achieve the inflation target in a relatively new and untested framework with shallow financial markets. In other words, we assume that the central bank reacts relatively aggressively to small deviations from the target.

- However, we also assume that the central bank smoothes out interest rates by choosing a γ_{RSlag} parameter value of 0.5, in line with other country models. This means that the central bank also incorporates considerations about policy stability when moving its interest rate.

Steady-State Values

110.   The long-term steady-state values for key parameters—the inflation target, potential output growth, and the real interest rate—have an impact on the direction and speed of convergence of the model, particularly in the outer years. However, these values are not essential for the short- and medium-term forecasting exercise. We set the long-term inflation target at 4 percent and the long-term interest rate at 4 percent. We set the long-term potential output growth at 5½ percent, a relatively high value in the very long run, but close to the current average rate of growth. This assumes that in the long run, structural reforms to enhance productivity and EU integration will sustain high growth rates after the initial catching up effect from the economic collapse of the 1990s has faded.

Model Historical Robustness

111.   Overall, the relatively small "Model residuals and judgment" in Table 2 for the period 2005q1 to 2007q4 suggest that the model is broadly able to replicate the recent historical data series. However, it is far from perfect, suggesting that more work is needed in adjusting parameter values. The notable deviations are the jump in inflation in 2005q1, which is due the introduction of the VAT—an exogenous shock that the model cannot anticipate; the maintenance of high inflation in 2006q2 despite a strong real appreciation; the more-rapid-than-predicted disinflation in the second half of 2006 and in 2007q1; and the spike in inflation in the second half of 2007 despite real appreciation—in part due to supply shocks.

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[48] The original Taylor rule would imply a weight on the lagged interest rate of zero and the weights on inflation and the output gap each equal to 0.5.

Table 2: Baseline Forecast in December 2007

	2005q1	2005q2	2005q3	2005q4	2006q1	2006q2	2006q3	2006q4	2007q1	2007q2	2007q3	2007q4	2008q1	2008q2	2008q3	2008q4	2009q1	2009q2	2009q3	2009q4
Short-Term Interest Rates																				
Serbia	17.2	15.6	13.8	16.0	20.3	20.7	18.9	16.8	12.8	10.0	9.6	9.6	9.5	9.3	9.0	9.7	8.8	8.5	8.5	8.5
Euro Area	2.1	2.1	2.1	2.2	2.4	2.7	3.0	3.4	3.7	3.9	4.2	4.4	4.1	3.9	3.8	3.7	3.7	3.7	3.7	3.8
Differential	15.1	13.6	11.7	13.8	17.9	18.0	15.9	13.4	9.2	6.1	5.4	5.2	5.4	5.3	5.2	5.3	5.1	4.8	4.8	4.7
Exchange Rates																				
Value of Euro (in Dinar)																				
level	80.209	81.877	83.837	85.709	87.089	86.905	83.264	79.533	79.985	81.078	79.872	79.977								
% y-o-y	15.9	15.7	14.3	11.4	8.6	6.1	-0.7	-7.2	-8.2	-6.7	-4.1	0.6								
% q-o-q	17.9	8.6	9.9	9.2	6.6	-0.8	-15.7	-16.8	2.3	5.6	-5.8	0.5								
Value of 100 Dinar (in Euro)																				
level	1.25	1.22	1.19	1.17	1.15	1.15	1.20	1.26	1.25	1.23	1.25	1.25								
Real Exchange Rate Gap																				
Serbia	7.79	8.24	8.12	7.63	7.07	5.22	0.99	-2.67	-1.66	-0.96	-4.15	-4.27	-3.63	-3.69	-4.37	-3.41	-4.40	-3.94	-4.27	-3.07
Real GDP Growth																				
Serbia																				
% y-o-y	8.2	7.3	7.6	6.7	6.0	5.7	5.0	5.6	7.6	8.0	6.6	5.5	4.6	4.8	6.5	7.4	6.8	5.9	5.1	4.8
% q-o-q	4.7	6.2	10.5	5.3	2.0	5.2	7.7	7.5	10.0	7.0	2.3	3.1	6.2	8.0	8.8	6.8	3.8	4.1	5.6	5.6
Euro Area																				
% y-o-y	1.3	1.4	1.8	1.9	2.4	2.9	2.8	3.3	3.2	2.5	2.5	2.0	1.8	2.1	2.1	2.2	2.1	2.1	2.1	2.1
% q-o-q	1.3	2.1	2.7	1.4	3.6	4.0	2.3	3.5	2.9	1.4	2.0	1.8	2.1	2.2	2.2	2.2	1.9	2.2	2.2	2.2
Sacrifice Ratio																				
Serbia	-12.2	-12.0	-10.8	-9.8	-9.8	-10.1	-10.0	-9.7	-8.4	-7.0	-6.6	-6.8	-7.1	-6.9	-6.0	-4.9	-4.4	-4.2	-4.1	-4.0
Euro Area	-0.5	-1.1	-2.5	-4.2	-5.4	-6.2	-6.9	-7.3	-7.4	-7.8	-8.1	-8.5	-8.8	-9.1	-9.4	-9.6	-9.9	-10.1	-10.2	-10.3
CPI Inflation																				
Serbia																				
% y-o-y	17.0	16.9	17.0	18.2	14.9	15.4	12.5	8.3	5.7	4.7	6.5	9.0	10.4	9.9	9.0	7.8	7.0	6.5	6.2	6.0
% q-o-q	26.2	14.4	15.0	17.5	12.7	16.6	3.7	0.9	2.5	12.2	11.0	10.8	7.6	10.3	7.2	6.1	4.5	8.2	6.0	5.3
Euro Area																				
% y-o-y	2.0	2.0	2.3	2.3	2.3	2.5	2.2	1.8	1.9	1.9	1.9	3.2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9
% q-o-q	0.2	5.0	1.6	2.6	0.3	5.6	0.3	1.1	0.7	5.6	0.3	6.2	-3.7	5.6	0.3	6.2	-4.0	5.6	0.3	6.2
Core CPI Inflation																				
Serbia % y-o-y	14.1	14.9	14.8	15.3	11.9	11.5	10.7	6.9	4.7	2.7	2.4	5.3	6.1	7.0	6.4	4.9	4.1	3.7	3.3	3.0
Euro Area % y-o-y	1.5	1.4	1.3	1.4	1.3	1.4	1.4	1.5	1.8	1.9	1.9	2.2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9
Price of oil (Euro)																				
World market	35.1	40.3	49.2	47.6	50.7	54.4	54.0	45.8	43.6	49.1	53.5	59.9	59.4	58.8	58.4	57.8	57.3	57.1	57.0	56.7
Output Gap																				
Serbia	0.2	0.2	1.2	1.0	-0.0	-0.3	0.1	0.3	1.2	1.4	0.5	-0.3	-0.2	0.2	0.9	1.1	0.6	0.2	0.1	0.1
Euro Area	-1.4	-1.6	-1.4	-1.6	-1.2	-0.8	-0.7	-0.4	-0.2	-0.3	-0.3	-0.4	-0.4	-0.3	-0.3	-0.2	-0.3	-0.2	-0.2	-0.1
Potential Output Growth (% q-o-q)																				
Serbia	6.0	6.1	6.2	6.2	6.2	6.3	6.3	6.3	6.2	6.2	6.2	6.1	6.1	6.0	6.0	5.9	5.9	5.8	5.8	5.8
Euro Area	1.9	2.8	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Model Residuals and Judgment																				
Serbia																				
Inflation	10.3	-3.9	-4.1	1.2	-1.2	4.1	-6.3	-5.3	-3.1	3.9	3.7	2.1	-1.7	1.7	-0.5	-1.5	-1.9	1.9	0.5	-0.4
Core Inflation	11.2	-0.6	-2.0	0.8	-0.8	3.2	1.4	-8.9	-5.3	-2.7	3.1	5.1	-1.1	1.1	-1.1	-2.5	-3.0	0.9	-0.7	-1.7
Output Gap	-3.1	-5.1	-0.1	-0.7	-1.1	-1.5	0.5	0.3	-1.3	-0.7	-0.1	-0.9	-1.0	-0.1	-1.1	-1.1	-1.0	-0.1	-0.5	-0.4
Nominal Interest Rate	-3.1	-5.2	-6.1	-0.3	-6.1	-5.6	4.5	2.0	-1.3	-0.7	-2.2	-2.0	-2.4	-2.7	-3.0	-1.7	-1.6	-1.4	-1.1	-0.9
Real Exchange Rate (percentage points)	-1.2	-2.2	-6.4	-3.6	3.8	10.9	5.5	-4.9	-1.7	-3.3	-13.1	-12.9	-2.8	-3.7	-3.0	-4.3	-3.4	-3.7	-1.6	-2.7
Euro Area																				
Inflation	-1.8	2.9	-0.5	0.6	-1.5	3.4	-1.9	-0.8	-0.7	3.5	-1.8	3.9	-6.7	3.6	-1.6	4.2	-6.8	3.7	-1.5	4.2
Output Gap	-0.5	-1.3	-0.6	-1.0	-0.2	-0.7	-0.2	0.1	0.2	-0.8	-0.2	-0.7	0.8	-0.6	-0.2	-0.7	0.8	-0.6	-0.2	-0.7
Nominal Interest Rate	-0.4	-0.5	-0.5	-0.4	-0.4	-0.4	-0.1	-0.5	0.1	0.2	0.4	-0.1	0.1	0.0	-0.6	0.0	0.1	0.1	0.1	0.1
Oil equation (percentage points)	16.1	21.7	29.3	8.5	15.7	14.5	7.7	-10.0	-3.8	8.9	8.7	11.0	3.1	0.1	0.6	-1.7	0.0	-1.9	-0.9	-2.3

D. Using the Model

112.   In the first instance, we use the forecasts of the Serbian authorities or the IMF staff, not those produced by the model itself. Judgmental forecasts, which take into account a large amount of information and specific knowledge about the economy, should perform better in the short run than purely model-based forecasts, especially in the context of a model as simple as this one. However, the model can be used to assess the consistency of the forecasts. We then use the model to simulate a series of plausible shocks, with a view to assessing the risks to the baseline forecasts and analyze the impact of the endogenous policy reaction.

Baseline Analysis and Model Forecast

113.   The (judgmental) baseline assumes an unwinding in 2008–09 of the tight monetary stance of 2006–07 which, through high interest rates that contributed to significant real exchange rate appreciation, succeeded in bringing inflation down from double-digit rates. The lagged effect of real appreciation on growth, which will slow down to or below potential, will also remove inflationary pressures stemming from excess demand. At the same time, gradually lower interest rates will generate a slight nominal and real depreciation which, while consistent with achieving low inflation, will sustain growth in the medium term (Table 3, baseline).

Table 3: Baseline and Model-Based Forecast, 2007-08
(Annual average in percent, unless otherwise indicated)

	Est.	Baseline		Model (deviation)		
	2007	2008	2009	2008	2009	
Short-term interest rate	10.5	9.2	8.6	4.2	1.7	p. points
RPI inflation	6.5	9.3	6.4	-0.4	-1.5	p. points
Core RPI inflation	3.8	6.1	3.5	0.5	1.2	p. points
Exchange rate (€/Din.)	0.0125	...	...	3.3	6.2	percent
Real GDP growth	7.0	5.8	5.6	-1.4	-0.3	p. points
Output gap	0.7	0.5	0.2	-1.3	-1.7	p. points

Source: IMF staff projections.

114.   Comparing the judgmental baseline forecast with the purely model-based forecast suggests the need for monetary tightening in the face of rising inflation (Table 3, last two columns). The model projects somewhat higher interest rates in the short term to maintain a real interest rate differential with the euro area, thereby supporting the more appreciated exchange rate needed to reduce both headline and core inflation, which tend to converge. However, this comes at the cost of lower growth than in the baseline due to the real appreciation and the high real interest rates.

Risk Analysis

115.   **Real exchange rate appreciation** (Table 4). This shock is modeled as a temporary and exogenous decline in the currency risk premium, resulting in a one-quarter nominal exchange rate appreciation of 10 percent. This could be due to a favorable but temporary event affecting Serbia and giving rise to a positive change in expectations. Given the high pass-through, the appreciation reduces headline and core inflation significantly, leading the central bank to react by lowering interest rates. The real appreciation has a negative impact on growth in the short run and creates a persistently negative output gap. Since the real appreciation helps the central bank achieve its disinflation target, and the reaction function does not put a large weight on the output gap, the model does not call for an aggressive reduction in the interest rate to boost growth and close the output gap. The real appreciation, thus, persists for some time.

Table 4: Risk Analysis, 2008-09
(Deviation from baseline, in percentage points or in percent)

	Baseline (Annual average)		Dinar appreciation		Dinar depreciation		Higher interest rate		
	2008	2009	2008	2009	2008	2009	2008	2009	
Short-term interest rate	9.2	8.6	-1.6	-1.0	1.8	1.1	0.9	-0.5	p. points
RPI inflation	9.3	6.4	-1.3	-0.2	1.4	0.3	-0.4	-0.2	p. points
Core RPI inflation	6.1	3.5	-0.9	-0.3	1.0	0.3	-0.3	-0.2	p. points
Exchange rate (€/Din.)	...	...	7.5	2.6	-7.7	-2.8	2.3	1.2	percent
Real GDP growth	5.8	5.6	-0.7	0.2	0.8	-0.3	-0.3	0.0	p. points
Output gap	0.5	0.2	-0.7	-0.5	0.8	0.6	-0.3	-0.2	p. points

Source: IMF staff projections.

116.   **Real exchange rate depreciation** (Table 4). This shock has opposite effects from the previous one. An exogenous increase in the risk premium (causing the nominal exchange rate to depreciate by 10 percent for one quarter) and the associated real depreciation cause inflation to rise in the short run, triggering a monetary response via higher interest rates. The real depreciation also provides a short-term boost to growth. After a few quarters, the shock unwinds. Through the monetary response, first the nominal and then the real exchange rates both appreciate, slowing inflation and growth down and back to the baseline. The monetary response needs to be relatively vigorous to undo the inflationary impact of the shock and return to the disinflation path. Nevertheless, the temporary shock generates a lasting positive output gap due to the one-time increase in output.

117.   **Negative interest rate shock in Serbia** (Table 4). This shock involves a temporarily higher nominal interest rate than in the baseline due, for example, to a misjudged monetary policy tightening. The nominal interest rate increases by 3 percentage points in one quarter, then reacts again according to the model reaction function. As a result, the exchange rate

appreciates in both nominal and real terms and inflation drops, but at the cost of slower growth. With inflation below target and growth slowing down, the central bank reduces interest rates below the baseline after three quarters, but it takes two years for growth to return to the baseline and for the output gap to close. It should be noted, however, that in this rational expectations model, economic agents *know* that the central bank will ultimately return to its model reaction function and they anticipate such action. This moderates somewhat the impact of the excessive tightening.

118.   **Oil price shock** (Table 5). In this shock, the price of oil rises by 50 percent relative to the baseline during 2 quarters, and then returns to the baseline over the next year and a half. The shock raises headline inflation, but with a small pass-through to core inflation (by assumption, see Section C). But because the central bank is assumed to take some account of headline inflation, it reacts by raising interest rates during 6 quarters. The exchange rate depreciates on impact because of the drop in real interest rates (as inflation rises more than nominal interest rates) but, as inflation is contained and real interest rates rise, it appreciates back to and above the baseline after two quarters. Potential output growth drops due to the direct oil price effect, and this in turn reduces output for about two years. In response to lower growth, the monetary policy response is unwound during the second year through significantly lower interest rates than in the baseline. This, and the subsequent drop in oil prices back to the baseline, provides a boost to actual (and potential) output to close the output gap.

Table 5: Risk Analysis, 2008-09
(Deviation from baseline, in percentage points or in percent)

	Baseline (Annual average)		Oil price shock		Fiscal shock		Foreign demand shock		
	2008	2009	2008	2009	2008	2009	2008	2009	
Short-term interest rate	9.2	8.6	1.8	-0.8	0.9	0.6	2.5	4.2	p. points
RPI inflation	9.3	6.4	2.7	-0.2	-0.3	-0.3	0.6	1.6	p. points
Core RPI inflation	6.1	3.5	0.1	0.0	0.0	0.2	0.6	1.4	p. points
Exchange rate (€/Din.)	...	...	-0.2	3.1	3.5	7.1	-1.8	-4.4	percent
Real GDP growth	5.8	5.6	-0.5	-1.1	2.3	-1.2	0.1	-0.4	p. points
Output gap	0.5	0.2	-0.1	-1.0	2.2	0.9	0.1	-0.2	p. points

Source: IMF staff projections.

119.   **Fiscal or domestic demand shock** (Table 5). This shock simulates a temporary increase in domestic demand, brought about for example by expansionary fiscal policies. The output gap increases by 2 percentage points for one quarter, and is then phased out only gradually (by 85 percent per quarter). Because of the low parameters assumed regarding the impact of the output gap on inflation and the low weight attributed to it in the monetary policy reaction function, the effect of the shock is relatively benign on inflation and nominal interest rates. Growth increases temporarily along with higher demand. The central bank reacts by raising nominal interest rates above the baseline. This causes the exchange rate to appreciate, keeping inflation down and, in turn, leads to a sharp slowdown in growth to below potential after about a year already. This scenario illustrates how the sharp real appreciation brought about by a surge in domestic demand can, after the initial boost has passed, choke off growth.

120.   **Foreign demand shock** (Table 5). This shock, where the euro area output gap increases by 1 percentage point for one quarter and is then gradually phased out (by 85 percent per quarter), could reflect, for example, a strong rise in demand from the euro area for Serbian exports following positive steps toward EU integration. The temporary increase in foreign demand raises domestic growth (and the output gap) mildly in the short term. However, in the absence of an increase in potential output, this raises inflationary pressures, which the central bank addresses by increasing interest rates. Interestingly, most of the impact of this shock runs through the response of the euro area. To dampen the demand shock in the euro area, the ECB raises interest rates, causing the dinar to depreciate because of the drop in the real interest rate differential. The exchange rate channel is the channel through which inflationary and demand pressures are passed on to Serbia, thereby prompting significant monetary tightening over the projection period.

121.   **Reduction in the inflation target** (Table 6). A permanent reduction in the numerical value of targeted inflation can, in this forward-looking model, achieve rapid results in terms of disinflation within a few quarters. However, the rapid disinflation leads to an increase in the real interest rate and to nominal and real exchange rate appreciation, which in turn result in a drop in growth. The central bank reacts only gradually by reducing nominal interest rates. Thus, growth returns to the baseline rate after three years, but the cumulative output loss is significant.

122.   **Domestic inflation shock** (Table 6). This shock simulates a temporary increase in non-core prices—for example a one-off increase in energy or utility tariffs.[49] In response, the central bank gradually raises interest rates because its reaction function includes headline inflation and because it anticipates some feedback from headline into core inflation. This raises real interest rates and leads to real exchange rate appreciation, causing GDP growth to

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[49] Headline inflation increases by 3 percentage points (year-on-year) above the baseline for one quarter.

slow. Growth only recovers to the baseline after three years, leaving a significant and persistent negative output gap.

Table 6: Risk Analysis, 2008-09
(Deviation from baseline, in percentage points or in percent)

	Baseline (Annual average)		Reduction in inflation target		Domestic inflation shock		Euro area interest rate shock		Rise in reserve requirements		
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	
Short-term interest rate	9.2	8.6	-0.2	-1.8	3.1	1.9	0.1	-0.2	0.0	0.0	p. points
RPI inflation	9.3	6.4	-0.9	-1.8	3.9	1.7	0.4	-0.1	0.0	0.1	p. points
Core RPI inflation	6.1	3.5	-0.9	-1.8	0.0	0.3	0.2	-0.1	0.0	0.0	p. points
Exchange rate (€/Din.)	...	...	3.9	6.7	0.4	3.2	-2.7	-1.5	-0.2	-0.6	percent
Real GDP growth	5.8	5.6	-0.3	-0.4	-0.3	-1.0	-0.2	0.4	-0.1	0.0	p. points
Output gap	0.5	0.2	-0.3	-0.8	-0.3	-1.4	-0.2	0.2	-0.1	-0.2	p. points

Source: IMF staff projections.

123.   **Euro area interest rate shock** (Table 6). A temporary increase in euro area interest rates (by 2 percentage points for two quarters) leads—through the exchange rate depreciation brought about by the lower real interest rate differential—to a slight rise in Serbian inflation. This requires some monetary tightening in the short run. The impact of euro area interest rates on the euroized domestic environment also lead to lower growth.

124.   **Increase in reserve requirements** (Table 6). The model suggests some slowdown in growth resulting from a permanent increase in reserve requirements above the baseline. The central bank does not react significantly with interest rates, and the slowdown in real growth is partially compensated by exchange rate depreciation.

125.   **Productivity shock or positive supply shock.** In this model, as expected, an increase in potential output translates into an increase in growth, and nothing else is affected as there are no imbalances.

Appendix I: Definition of Variables

$ygap$ output gap $(y_t - y_t^*)$, percentage points

y_t log of real GDP

y_t^* log of potential real GDP

g_t^* growth rate of potential GDP, quarter/quarter at annual rate, percentage point

$\bar{g}$ steady state growth rate of potential GDP, Q/Q at annual rate, percentage point

π CPI inflation, quarterly at annualized rate, percentage points

π^* target inflation rate, annualized rate, percentage points

$\pi4_t$ four-quarter change in the CPI, annualized rate, percentage points

$\bar{\pi}$ Steady state inflation target, annualized rate, percentage points

$\pi_{roil,t}$ change in the relative price of oil, quarterly at annualized rate, percentage points

$\pi4_{roil,t}$ four-quarter (moving average) change in the relative price of oil, percentage points

CPI_t level of the domestic consumer price index

CPI_t^{EA} level of the Euro Area consumer price index

RS nominal interest rate, in percentage points

RR real interest rate, in percentage points

RR^* equilibrium real interest rate, in percentage points

$RRgap$ real interest rate gap $(RR - RR^*)$, in percentage points

$\overline{RR}$ steady state equilibrium interest rate, in percentage points

RR^{EA} Euro Area real interest rate, in percentage points

RR^{*EA} equilibrium euro area real interest rate, in percentage points

ρ^* equilibrium risk premium on the domestic currency

z log of the real exchange (an increase implies a depreciation)

z^* log of the equilibrium real exchange rate (an increase implies a depreciation)

$zgap$ real exchange rate gap $(z - z^*)$, percentage points

S nominal exchange rate, value of foreign currency in local currency

$\bar{z}$ log of the steady state equilibrium exchange rate

Appendix II: Data

For both Serbia and the euro area, quarterly historical data are from 1999q1 to 2007q4. Forecasts run from 2008q1 to 2012q4 and are IMF staff projections prepared in the context of the biannual *World Economic Outlook* (WEO). For Serbia, the relevant definitions and sources are provided below.

GDP	Gross domestic product in constant prices of 2002. Source: Serbian Statistics Office (SSO). Seasonally adjusted.
Ygap	Difference between trend GDP (the trend-cycle term in the seasonal adjustment procedure) and potential GDP (calculated using the standard Hodrick-Prescott filter with no priors).
CPI	Retail price index. Source: Serbian Statistics Office (SSO). Seasonally adjusted.
CPI_X	Core retail price index. Includes only 48 percent of the full CPI; main excluded items are energy, utilities, public transportation. Calculated by IMF staff, seasonally adjusted.
Interest rate	Before 2005, weighted average of interest rate on NBS bills. From 2005 onward, weighted average of interest rate on NBS repo operations. Source: NBS. The equilibrium interest rate is simply the HP-filtered series.
Exchange rate	Dinar/euro exchange rate. Source: NBS. The equilibrium exchange rate is simply the HP-filtered series.
Price of oil	IMF WEO price of oil (simple average of UK Brent, Dubai, and West Texas Intermediate spot prices) in dollars converted to domestic currency. Source: IMF staff.

Euro area data come from IMF staff, based on Eurostat and WEO forecasts. Potential GDP is calculated using an enhanced HP filter that allows to impose prior views on the output gap. The euro area nominal interest rate is the ECB's main refinancing rate.

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VII.   THE FISCAL IMPACT OF PRIVATIZATION[50]

> **Objective:** To assess the potential budgetary impact of privatization based on a sample of 30 socially owned enterprises privatized in Serbia in 2005.
>
> **Main results:** The fiscal contribution of privatization in terms of increased collection of taxes and social security contributions, reduced government subsidies and arrears to public utilities, and interest savings can be sizeable.
>
> **Policy implications:** Privatization, in addition to raising the efficiency of companies and the economy, is likely to have a significant positive impact on fiscal performance.

126.   **Privatization of state- and socially owned companies is an important element of transition reform.** Its main objectives are to enhance economic efficiency and accelerate income growth, and to improve the fiscal performance of the public sector. Using Serbian data, this chapter looks at the latter objective. It concludes that privatization strengthens the public sector budget by:

- Strengthening the tax base, which comes from increased profitability and liquidity of the privatized companies, which are then more able to pay taxes;

- Reducing fiscal subsidies and other forms of public financial support;

- Using privatization proceeds to reduce budget financing requirements through debt; and

- Reducing quasi-fiscal activities of state-owned utilities.

127.   **This chapter is structured as follows**. Section A presents the analysis, Section B discusses the results, and Section C concludes and points to some caveats and directions for further work.

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[50] Prepared by Ivan Bjelicic and Dusan Demek (IMF Office in Belgrade) under the supervision of Harald Hirschhofer (Resident Representative). This section provides background information and analysis in support of section E of the Serbia Staff Report.

A. Analysis

128. We quantify the impact of privatization on fiscal performance by observing financial flows in 2003–07 between the public sector and a sample of 30 companies (out of about 200) privatized in 2005.[51, 52] These flows (the "fiscal contribution") consist of tax revenues, government subsidies, interest costs, and other quasi-fiscal deficits (QFD). Written in annual differences, we have:

$$\Delta \text{ Fiscal contribution} = \Delta \text{ Tax revenue} - \Delta \text{ Subsidies} - \Delta \text{ Budget financing costs} - \Delta \text{ Quasi-fiscal deficits}$$

- **Direct tax revenues** consist of the corporate income tax (CIT), the wage tax, social security contributions (SSC), and the property tax.

- **Subsidies to our sample companies** consist mostly of soft credits with interest rates below market rates.

- **Privatization revenues, if saved, reduce budget financing costs.**[53] Sales proceeds transferred to the budget can be used to permanently lower the stock of Treasury bills. Savings can be calculated by applying the historic period T-bill rate on that stock reduction. The impact is measured by the interest saved on the reduced stock of bills.[54]

- **Quasi-fiscal deficits mainly arise from arrears towards public utility companies.** This deficit is measured by the annual change in arrears of our sample towards the state-owned electricity provider EPS (data on arrears towards other public utility companies were not available).

B. Findings

129. **The total fiscal contribution of the sample improved significantly during the period observed.** Table 1 summarizes the results.

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[51] The 30 companies were randomly selected, with 10 from each group of large, medium, and small enterprises. Classification criteria follow the Law on Accounting and Auditing (average number of employees, annual total income, and average property value).

[52] The tax administration does not have detailed data on taxes collected before 2003.

[53] Barnett (2000) finds that this relationship is about one-for-one in transition economies (the study does not include Serbia).

[54] For our calculations, we use the average discount rate from the mid-year treasury bill auction in June; the rates are multiplied by the annual stock of cash accumulated from privatization of our sample over the period.

Table 1. Fiscal Contribution of Sample Companies, 2003–07 H1
(RSD million)

		2003	2004	2005	2006	2007 H1
Total estimated fiscal contribution (1-2-3-4)		778.6	675.0	1,504.3	2,549.7	1,368.1
In percent of GDP		0.066%	0.047%	0.086%	0.120%	0.113%
1.1.	CIT	3.5	1.8	3.4	88.9	123.9
1.2.	Wage Tax	234.8	191.1	290.7	456.5	245.5
1.3.	Contributions	551.0	479.0	773.4	1,131.0	643.1
1.4	Property Tax	7.8	7.8	21	19.5	12.3
2.	Subsidies	18.5	10	11.5	0	0
3.	Budget financing costs 1/	0	0	-439.3	-840.1	-335.4
4.	Quasi-fiscal deficit 2/ 3/	…	-5.3	12.0	-13.7	-7.9

Sources: Ministry of Finance, Tax Administration, Ministry of Economy and Regional Development,
Privatization Agency, Share fund, Statistical Office, and staff calculations.
1/ Discount rates used: 15.50%, 14.44%, 6.01%. Those are multiplied by the annual stock of cash
accumulated from privatization of our sample during the period of observation.
2/ First 9 months in 2007.
3/ Corrected in 2005 for debt-write offs of 2.7 million RSD.

130.   **Corporate income taxes collected from our sample rose strongly after
privatization.** CIT collections were boosted over the observed period, as the sample firms
increased output and profitability with rationalization and measures to improve operating
efficiency.[55] The improvement of the sample CIT performance is also significant if measured
as a share of total CIT collections in Serbia (Table 2). This measure is insensitive to
structural breaks, such as changes in the CIT rate,[56] as presumably these structural changes
impact all companies equally.

Table 2. Corporate Income Taxes of Sample Companies
(RSD million)

	2003	2004	2005	2006	2007H1
Operating revenue	11,298	13,526	16,468	23,739	...
(In percent of GDP)	0.96%	0.95%	0.94%	1.12%	...
CIT Serbia	5,933	6,922	10,307	18,313	17,273
CIT sample / CIT Serbia	0.06%	0.03%	0.03%	0.49%	0.72%

Source: Ministry of Finance, Tax Administration.

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[55] There is a large increase in the output per employee one year after privatization as operating revenue rose by
44 percent (Table 2) and employment fell by 11 percent. World Bank research (2005) shows that the
productivity of privatized firms in Serbia is 60 percent higher than that of the benchmark socially owned firms.

[56] The CIT rate was lowered in 2004 from 14 to 10 percent.

131.   **Privatization boosted payments of wage taxes and social security contributions (SSC).** Total collections of the sample companies doubled in the observed period, although employment numbers fell by 23 percent. As a result, each employee of our sample contributed 3 times more to social security in 2006 than the average Serbian worker (Table 3).

Table 3. Impact of Privatization on Social Security Contributions (SSC)

	2003	2004	2005	2006
SSC sample (per capita, 000 RSD)	64.3	58.7	103.4	170.3
SSC Serbia (per capita, 000 RSD) 1/	27.8	35.6	42.2	53.7
Employed sample 2/	8,569	8,158	7,478	6,639
Employed Serbia 2/ 3/	2,041,395	2,050,854	2,068,964	2,025,627

Source: Tax Administration, Ministry of Finance, Statistical Office Republic of Serbia, Solvency Centre.
1/ Excluding the agricultural producers pension fund.
2/ Annual average.
3/ Excluding agriculture.

132.   **Government subsidies to our sample ceased after privatization.**[57] This is especially notable given that before privatization, subsidies distributed to the sample were higher than the CIT collected from it (Table 1).

133.   **The sample companies were sold for a total of €89.1 million.** However, because the privatization law allows for installment payments, actual cash collections were lower.[58] We calculated that these receipts reduced domestic financing costs significantly (by €5.3 million in 2005, by €10.0 million in 2006 and by €4.2 million in the first half of 2007).

134.   **The contribution of our sample to the quasi-fiscal deficit fell during the period except in 2005.** Privatization seems to have improved payment discipline significantly, except during the year of privatization (perhaps due incentives to boost expenditures and debt before the expected privatization and its associated debt write-offs). This is visible in the drop in the stock of arrears of the companies in the sample towards the state-owned electricity provider EPS.

[57] Only 5 companies from our sample received subsidies from the Development Fund.

[58] Cash collections amounted to €34.2 million in 2005, €34.9 million in 2006 and around €0.2 million in the first half of 2007.

Table 4. Stock of Arrears towards EPS(Sample Companies)
(RSD million)

	2003	2004	2005	2006	2007H1
End of the year stock	32.3	27.0	36.3	22.6	14.7
Debt write-offs	0.0	0.0	2.7	0.0	0.0

Source: EPS.

C. Concluding remarks

135. **The analysis above, based on a small sample of privatized industries in various classes, indicates that privatization can result in sizeable fiscal savings.** A linear extrapolation of the sample results for these 30 companies to the total population of enterprises privatized in 2005 of about 200 companies would result in a potential fiscal contribution of about ¾ of one percent of GDP in 2006. A number of important caveats, however, apply:

- **Such a calculation would assume that the sample is representative of the total pool of privatized companies, which may not be the case.** This argument applies in particular to the increased efficiency as a result of the privatization. Expanding the sample and observation period would allow a better assessment of the validity of the findings.

- **The analysis only captures the direct impact of privatization on the tax base**. However, here are indications that there are also secondary effects, i.e., that privatization triggered contracting out to existing or new private companies, thereby potentially further boosting tax payments.

- **The reduction in subsidies may be underestimated.** The data only captures the distribution of subsidies through the Development Fund. There is a lack of information as to whether some of the companies from the sample received subsidies and financial support from other government levels and institutions. If so, it can assumed that they would shrink or cease as well.

- **A comprehensive quantification of quasi-fiscal activities was not possible due to a lack of readily available data.** The analysis excludes arrears to locally owned companies, mainly utilities, and to the state-owned oil company NIS.

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