

**Republic of Serbia: Financial Sector Assessment Program Update—
Technical Note on Banking Sector Soundness and Stress Testing**

This Technical Note on Banking Sector Soundness and Stress Testing on the Republic of Serbia was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on March 2010. The views expressed in this document are those of the staff team and do not necessarily reflect the views of the government of the Republic of Serbia or the Executive Board of the IMF.

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FINANCIAL SECTOR ASSESSMENT PROGRAM UPDATE

REPUBLIC OF SERBIA

BANKING SECTOR SOUNDNESS AND STRESS TESTING

TECHNICAL NOTE

MARCH 2010

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I. INTRODUCTION¹

1. **This technical note analyzes the banking sector soundness and identifies vulnerabilities.** It focuses on the balance sheet structure of the banking system, corporate and household sector performance, and the banking sector's risk exposures. The analysis is informed by the results of the stress tests designed to assess the resilience of the banking sector. At the end, the note presents the key findings and recommendations.

A. Structure of the Financial Sector

2. **The Serbian financial sector has grown significantly since 2005, but remains relatively small and dominated by banking institutions.** Financial sector assets grew from 52 percent of GDP in 2005 to over 70 percent of GDP in 2007, with the crisis halting this growth since 2008. The share of banking sector assets in total financial sector assets has remained stable at around 89 percent (Table 2). Although some consolidation has taken place, the degree of bank concentration is somewhat lower than that seen in some neighboring countries (Table 1), with the five largest banks accounting for 46 percent of the total banking system's assets at mid-2009.

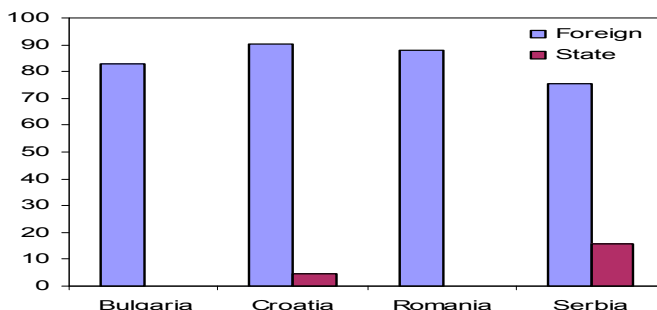
Table 1. Bank Concentration, 2008-09

	HHI ²
Serbia	650
Bulgaria	834
Romania (2007)	1041
Croatia	1355

Sources: Fund staff estimates and national central banks' websites.

3. **State ownership of the banking sector has diminished.** Through privatization, the share of state-controlled banks declined from 21 percent of total assets in 2005 to 18 percent in 2009Q2. Nevertheless, state ownership remains high, compared to countries in the region (Figure 1). Nine banks remain with significant public stake, including four majority state-owned banks with a combined market share of 2.6 percent, two banks in which the EBRD and the state constitute the majority shareholder (11.3 percent combined market share), and three banks in which the state alone holds stakes of around 20-30 percent (3.9 percent combined market share).

Figure 1. Bank Ownership, 2007



¹ This note was prepared by Nada Oulidi and Piyabha Kongsamut.

² The Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared market shares of the banks. A range of under 100 is considered highly de-concentrated, 100-1000 less concentrated, 1000-1800 moderately concentrated, and above 1800 highly concentrated.

Table 2. Structure of Financial System, 2005-09 H1

(In billions RSD unless indicated otherwise)

	2005			2006			2007			2008			2009-H1		
	No.	Assets		No.	Assets		No.	Assets		No.	Assets		No.	Assets	
		(RSD billion)	(percent of total)		(RSD billion)	(percent of total)		(RSD billion)	(percent of total)		(RSD billion)	(percent of total)		(RSD billion)	(percent of total)
Financial sector	73	874	100	70	1,293	100	80	1,733	100	85	1,989	100	86	2,083	100
(Percent of GDP at market prices)		52			65			73			73			71	
Banking system:	40	775	89	37	1,169	90	36	1,564	90	34	1,777	89	35	1,860	89
State-owned banks	11	185	21	8	174	13	8	246	14	8	284	14	9	377	18
Local private banks	12	78	9	7	76	6	6	136	8	6	154	8	6	101	5
Foreign-owned banks	17	512	59	22	920	71	22	1,181	68	20	1,339	67	20	1,382	66
Nonbank financial institutions:	33	98	11	33	124	10	44	169	10	51	212	11	51	223	11
Leasing companies	14	52	6	15	68	5	17	95	6	17	123	6	17	120	6
Pension funds	0	0	0	1	0	0	7	3	0	10	5	0	10	6	0
Insurance companies	19	46	5	17	56	4	20	71	4	24	85	4	24	97	5
Memorandum item:															
Domestic government debt/GDP			23			18			14			12			
Stock market capitalization 1/		389	23		658	33		1,292	55		765	27		748	25

Source: Data provided by the Serbian authorities.

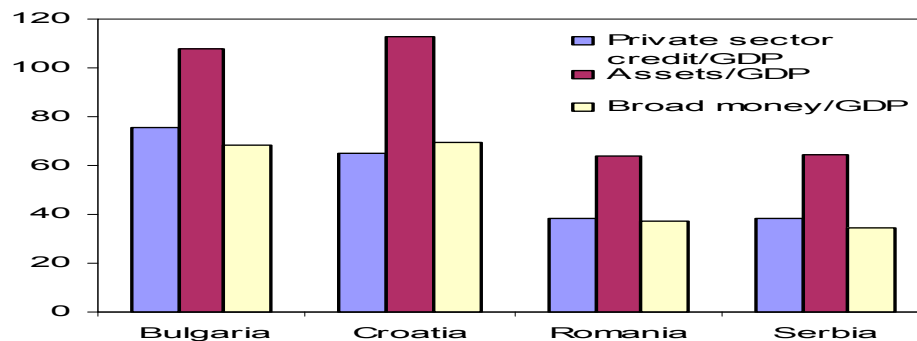
1/ Expressed in RSD billion and in percent of GDP, respectively across the columns.

4. **Foreign-owned banks have increased their dominance, while local private banks are mostly small.** Foreign ownership has now risen to almost 75 percent of the banking system, with subsidiaries of Austrian, Greek, and Italian banks within the top five banks in the country, in terms of assets. Banks from these three countries combined have close to a 60 percent market share, with French and German banks also among the top 12 banks. Most of the local private banks are small, with only one fully private Serbian bank among the top 10. These banks tend to be specialized in specific markets, regions, type of clients (e.g. retail), or sectors (e.g. military-related corporates).

5. **Nonbank financial institutions (NBFIs) have been growing apace, but remain relatively small at 11 percent of the financial sector.** The NBFIs consist of financial leasing companies (almost 60 percent of NBFIs assets), insurance companies (40 percent), and pension funds (less than 1 percent). Most leasing companies are foreign-owned, and rely mostly on long-term funding from abroad (87 percent of liabilities). Asset growth leveled off in 2009, partly reflecting the difficult funding conditions internationally. The top three areas financed include (a) transportation, warehousing, and communications; (b) manufacturing; and (c) trade. The insurance sector is nascent and primarily foreign-owned.

6. **There remains room for financial deepening to further Serbia's development.** Despite fast growth in recent years, assets relative to GDP are fairly low compared to peers in the region. Similarly, there is room for banks to intermediate more credit to the private sector (Figure 2). As for other sectors, foreign inflows into the stock market drove market capitalization to 55 percent of GDP in 2007. The ratio plummeted to 25 percent of GDP in early 2009, before recovering to about 30 percent of GDP more recently, and average daily turnover for 2009 was 14 percent of its 2007 levels. Bond trading in the secondary market is largely limited to trading in foreign currency savings bonds, and other domestic government securities markets are small (see Technical Note on Systemic Liquidity).³

Figure 2. Banking Indicators, 2008



³ Tradable savings bonds were issued by the government in 2001 against foreign currency deposits first frozen in 1991, with maturities from 2002 to 2016.

II. STRUCTURE OF BANKING SYSTEM ASSETS AND LIABILITIES

7. **Banks engage in traditional activities of accepting deposits and offering loans, in a highly euroized environment.** Euroization is high at 80 percent of loans and 70 percent of deposits. The high level of euroization is the legacy of years of macroeconomic instability and hyperinflation in the 1990s, and, until recently, negative real interest rates on dinar deposits. The latter did not turn positive until 2006, and dipped back into negative territory as inflation surged in 2008. Banks responded to offset their foreign exchange (FX) risk from the FX deposits and external borrowing by offering loans denominated in or linked to FX.

8. **Banks' assets consist mainly of FX-linked loans, with a small share of securities investments.** Loans account for almost 60 percent of assets (Table 3), and, except for local private banks, over three-quarters of loans are denominated in FX or FX-linked, predominantly in euros, but also in Swiss francs. Banks' holdings of T-bills and NBS certificates have risen to 7½ percent of total assets in June 2009, as banks have preferred to place their funds in safe assets in the current environment.⁴ Banks also hold over 20 percent of assets in cash and unremunerated reserves at the National Bank of Serbia (NBS). In the face of the crisis, the share of banks' holdings of cash in total assets almost doubled from December 2007 levels.

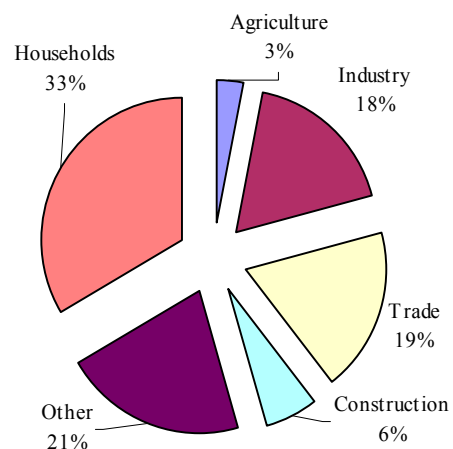
Table 3. Banking System Assets, June 2009

	Share of group total			
	State	Local Private Banks	Foreign	Total
Cash	18	14	11	13
Reserves at the NBS	10	6	12	11
Investments	2	3	2	2
Loans net of provisioning	57	59	60	59
Fixed and other assets	13	18	14	14

Source: NBS.

9. **Banks' credit growth has slowed sharply and remained quite diversified.** The growth in euroized credit to the private sector has declined from 21 percent at end 2007 (in euro terms) to four percent through the first half of 2009. Over half of the loans are granted to the corporate sector, and about a third of loans go to households (16 percent of total loans are in mortgages). In terms of economic activity, the industry and trade sectors receive the largest share of loans, at almost 20 percent each (Figure 3).

Figure 3. Loan Composition, 2009



⁴ Repos are captured in “fixed and other assets” in the table.

10. **To avoid reserve requirements on FX liabilities, local foreign-owned banks encouraged Serbian corporates to borrow directly from parent banks or other international banks abroad.**⁵ External debt from corporates to non-official creditors grew from €4.6 billion in 2006 to almost €11 billion in August 2009, larger than the banks' loan portfolio. Local banks act as a guarantor to these loans. Based on discussions with banks, cross-border lending was offered to the highest quality borrowers, leaving the domestic banking sector with more risky clients.

11. **Guarantees provided by local subsidiaries for these cross-border loans form a significant part of banks' off-balance sheet items.** The guarantees correspond to 63 percent of off-balance sheet items that are subject to credit risk with a value of € 4.8 billion as of December 2008.⁶ As fallout from the crisis, banks have not provided many more guarantees since the crisis began. Cognizant of the risks, the authorities require banks to classify these exposures in the same way as on-balance sheet items.

12. **The banks' funding structure has been quite stable.** Deposits account for 59 percent of total liabilities, of which 70 percent are in FX (Table 4). External liabilities constitute about 20 percent of total liabilities, through borrowing and deposits. External borrowing is somewhat longer term in nature (over 1 year maturity) than deposits. Interbank funding is minimal and carried out mostly by foreign-owned banks.

Table 4. Banking System Liabilities, June 2009

	(in percent of total)			
	State	Local private Banks	Foreign	Total
Interbank deposits	1	2	5	4
Non interbank deposits	71	59	51	55
Borrowing	3	4	12	10
<i>o/w due to foreign banks</i>	1	1	6	5
Other liabilities	6	3	9	8
Shareholder equity	19	32	23	23

Source: NBS.

13. **Parent banks have maintained support to their subsidiaries.** Foreign-owned banks' exposure to parent banks is varied and to a range of countries (Figure 5). However, the share of Serbian bank assets is small relative to total foreign group assets, at less than 3.5 percent for each of the ten largest foreign-owned banks, except for one, whose group exposure to Serbia was close to 14 percent. Some parent banks have provided a large share of support in capital, relative

⁵ According to BIS data, cross-border claims on an ultimate risk basis were €11 billion in March 2009 (and €10 billion on an immediate borrower basis). Credit to the non bank private sector was €15 billion. The overall exposure of European banks to Serbia was €16.9 billion in March 2009 (ultimate risk basis).

⁶ The half of off balance sheet items *not* subject to credit risk records items such as the foreign currency savings bonds, a legacy from past crises for which the banks act as custodians (see footnote 3), collateral pledged by borrowers, and to record the underlying collateral for NBS repos.

to other forms of support such as deposits or loans (Figure 4). This was linked to a recently removed regulatory restriction on the share of retail lending to Tier I capital (150 percent), when banks brought in foreign capital to support those activities. Foreign banks participating in the Financial Sector Support Program (FSSP) have maintained their exposure to Serbia (€8.74 billion at end-July 2009 compared to €8.72 at end-2008).⁷ However, as noted above, credit extension has slowed significantly (see para. 9).

Figure 4. Key Foreign Capital Sources
(in percent of exposures by country)

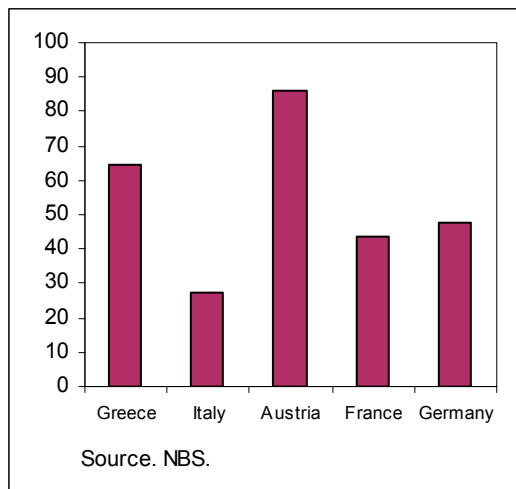
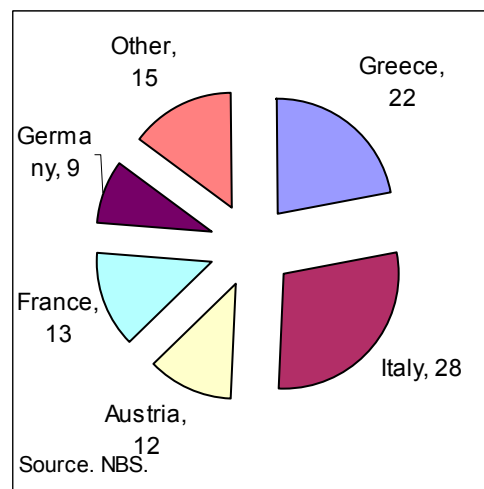


Figure 5. Exposure to Parent Banks
(in percent of total foreign exposure)



III. CORPORATE AND HOUSEHOLD SECTOR PERFORMANCE

A. Corporate Sector

14. **The corporate sector's activity and profitability have deteriorated markedly as a result of the crisis.**⁸ In 2008, activity growth decelerated with sales growth declining to 19 percent (from 29 percent in 2006, Table 5). Profitability declined significantly and companies registered considerable losses, reaching RSD 37 billion (versus RSD 50 billion in 2007) on aggregate. In turn, net profit margins declined to -0.2 and Return on Equity (ROE) plunged to -1.0 percent (down from 2.4 and 3.8 percent respectively in 2006). Large companies' profitability was worse than that of small and medium-sized enterprises (SMEs). Manufacturing, mostly the

⁷ The FSSP was part of the Fund program and involved commitments by parent banks to (a) maintain their exposure to Serbia at end-2008 levels through 2009-10; (b) provide adequate capital and liquidity support; and (c) participate in a diagnostic study involving stress tests. An MCM TA mission visited Belgrade in June 2009 to assist the NBS in developing the stress testing methodology for the FSSP component of the SBA.

⁸ The NBS Solvency Unit collects financial information on all companies operating in Serbia. There are currently around 90,000 companies, of which 925 are Large (defined as >250 employees and > €10 million turnover), 3,520 Medium-sized, and 85,389 Small Enterprises.

car industry and basic metals, registered the worst results, while the financial sector and construction were the most profitable (Table 6).

15. **The corporate sector's financial leverage increased in recent years, mostly for SMEs which relied more heavily on debt to finance their activities.** Total debt of the corporate sector constituted 58 percent of total assets, and nearly 70 percent of it was short-term. This presents significant rollover risk in an environment with tightened credit conditions. Large corporates relied less heavily on debt (equity to debt ratio of 0.9), but exhibited lower solvency ratios.

Table 5. Financial Indicators of the Corporate Sector, 2005-08

(in percent unless indicated otherwise)

	2006			2007			2008		
	Overall	Public	Other	Overall	Public	Other	Overall	Public	Other
Sales growth	29.1	14.8	30.3	20.6	-8.6	22.8	18.7	11.1	19.1
Profit margin	2.4	-1.7	2.8	1.0	-4.0	1.4	-0.2	-6.6	0.3
ROE (after tax)	3.8	-0.7	6.5	1.5	-1.6	3.0	-1.0	-2.6	-0.4
Current ratio (times)	1.0	0.7	1.0	1.0	0.6	1.1	1.0	0.6	1.0
Acid-test ratio (times)	0.7	0.6	0.7	0.7	0.5	0.7	0.7	0.6	0.7
Equity to Debt	1.0	2.9	0.7	0.9	2.8	0.7	0.7	2.5	0.6
Liabilities to assets	51.1	25.4	59.0	52.8	26.1	59.3	58.1	28.9	64.3
Current liabilities to total liabilities	0.7	0.6	0.7	0.7	0.6	0.7	0.7	0.6	0.7
Interest Coverage Ratio	2.7	0.1	3.1	1.7	-0.5	2.0	0.9	-2.5	1.2

Source: NBS

16. **Short-term liquidity remains at acceptable levels.** Current assets appear largely adequate to cover short-term liabilities. The current ratio hovered around 100 percent over the past three years, which is standard by international comparisons. Also, the acid-test ratio⁹ of 70 percent appears adequate. The high current and acid-test ratios suggest that liquidity risks are manageable and Serbian companies would be in a good position to withstand a sudden stop in access to credit, which somewhat mitigates the rollover risk discussed above.

17. **However, debt service capacity is modest and has followed a declining trend.** Due to increased indebtedness, lower profitability, and cash flows of the corporate sector, debt coverage deteriorated significantly in 2008. Earnings before interest and taxes (EBIT) covered less than 100 percent of interest payments, and debt service capacity of large companies was far lower than that of SMEs, with an interest coverage ratio of barely 0.2 (versus 4.0 for small enterprises).

18. **Serbian firms have a high concentration of FX liabilities.** In particular, external debt of corporate clients is high. This exposes them to FX and interest rate risks. Corporate loans contracted directly from international banks and capital markets have reached 36 percent of GDP. Total external debt of the corporate sector is almost equal to the total banking sector loans. This exposes the corporate sector to significant FX risk; both directly through FX open positions and indirectly through a depreciation in RSD (a significant share of borrowers are unhedged). This also presents a source of vulnerability to the domestic banking sector, through increased corporate sector indebtedness and decreased debt service capacity due to high interest expenses

⁹ The acid-test ratio (also referred to as the quick ratio) is defined as (current assets-inventories)/current liabilities.

and resulting lower earnings. As regards liquidity, a possible systemic risk emanates from an illiquidity contagion through intercompany debt collection and the blocked account mechanism.

Table 6. Financial Indicators of the Corporate Sector (By Sector), 2005-08

(in percent unless indicated otherwise)

	Equity/ debt	Current liabilities/ liabilities	Current assets/current liabilities	Return on Equity (ROE)	Profit margin	Interest coverage	Number of employees (ths.)
By Economic Sector:							
Agriculture, hunting, forestry and water affairs	1.2	0.8	1.0	-2.6	-1.9	0.0	51
Fishing	0.7	0.5	1.3	-13.8	-9.1	-2.7	1
Extraction of ore and stone	0.9	0.7	0.7	-7.4	-3.0	-2.5	41
Processing industry	0.5	0.7	1.1	0.4	0.4	1.3	394
Manufacture and supply of electric energy, gas and Construction	2.9	0.6	1.0	-5.4	-11.8	-11.4	49
Wholesale and retail sale; repair of motor vehicles, I	0.5	0.8	0.9	7.1	3.8	2.7	91
Hotels and restaurants	0.6	0.8	1.0	2.9	1.1	2.2	214
Traffic, storage and communications	1.0	0.6	0.7	-6.4	-7.6	-3.4	23
Financial intermediation	1.1	0.5	0.8	-4.2	-2.3	0.2	119
Real estate, renting and business activities	0.5	0.7	1.4	9.1	12.7	2.5	1
Public administration and defense, compulsory soci.	0.5	0.6	1.0	1.1	1.5	1.6	87
Education	-0.3	0.9	0.3	...	-21.1	...	...
Health and social work	0.5	0.8	0.7	23.2	5.3	11.9	4
Other community, social and personal service activi	0.5	0.8	0.8	-6.7	-1.7	-0.1	7
	1.3	0.7	0.7	-4.6	-4.3	-3.9	35
By Size:							
Small	0.4	0.8	1.0	9.6	2.4	4.0	386
Medium	0.6	0.7	1.0	-0.2	0.2	1.2	260
Large	0.9	0.6	1.0	-2.8	-1.5	0.2	472

Source: NBS

19. **Sector and size specific risks exist.** Large corporates, especially public companies, are facing more financial distress than SMEs, notably by public companies. They are more heavily leveraged, less profitable, and with less debt service capacity. As regards sectors, the manufacturing sector appears among the most financially distressed in terms of profitability and debt service capacity. The construction and financial intermediation sectors on the other hand appear the most profitable.

20. **To sum up, the corporate sector's financial distress presents a significant source of vulnerability to the banking sector.** In view of the significant losses and low cash flows, high indebtedness combined with low service capacity as outlined above, the banking sector's nonperforming loans (NPLs) could exhibit a further increase. In particular, external debt of the corporate sector and FX exposure is high and should be monitored closely. Special attention should also be given to the manufacturing sector and large corporates in view of their large share of the banking sector's loan portfolio. In this context, loan workout mechanisms should be strengthened to enhance loan recovery (see para. 48).

B. Household Sector

21. **Unemployment and RSD depreciation have weakened households' balance sheets.** Most of the household loans are to unhedged borrowers directly in FX or indirectly through indexing to FX (Table 7). Households' exposure to FX risk is partly mitigated by the high level

of FX deposits and remittances. However, FX depositors do not necessarily match the same FX borrowers. Under the NBS auspices, and as part of the FSSP, banks have started allowing borrowers to convert FX loans to RSD without penalties in order to increase household awareness and consumer protection. Serbian households still have a relatively low debt service burden by regional comparisons. Furthermore, households reportedly hold a positive net worth through deposits, investments, and assets held with life insurance and voluntary pension funds. Liquid assets cover around 78 percent of household loans. The average Loan-To-Value (LTV) ratio for mortgage loans ratio stands at 65.2 percent as of June 2009 (up from 60 percent in 2005). The NBS has introduced regulatory measures to curb household indebtedness; notably, it set limits of total allowable monthly debt service payments to between 30 and 50 percent (with mortgage debt) of net monthly income.

Table 7. Serbia: Household Sector Financial Ratios, 2005-09

	(in percent)					
	2005	2006	2007	2008	2008 H1	2009 H1
FX-indexed loans to total loans	...	80.1	81.5	79.6	79.3	78.9
FX-deposits to total deposits	92.0	90.7	91.0	90.6	91.5	91.5
FX-deposits to FX- and FX- indexed loans	...	177.8	172.6	143.1	176.2	158.4
Loan to value ratio for mortgage loans	60.6	61.6	64.9	65.4	65.4	65.3
Short-term loans to total household loans	17.7	19.6	15.0	11.6	16.2	12.1

Source: NBS

IV. FINANCIAL SOUNDNESS OF THE BANKING SECTOR

22. **The banking sector's capitalization is among the highest in the region (Figure 7).**

The banking sector's capital adequacy ratio (CAR) is at 21 percent, and all systemic banks maintain CARs above the 12 percent prescribed minimum. The additional capital buffers largely reflect the impact of prudential regulations, which aimed to slow credit growth in the pre-crisis period.¹⁰ Similarly, the leverage ratio (total equity/total assets), stands at a comfortable 23 percent, driven mostly by shareholders' paid-in capital and reserves.

23. **The asset quality of the banking sector has declined markedly with a surge in NPLs in 2009 (Table 8).**

The gross NPL ratio reached 16½ percent in June 2009, up from 11.3 percent in 2008, due to the general macroeconomic deterioration and exchange rate depreciation. NPLs were registered mainly in the corporate sector, with a concentration in the manufacturing, trade, and real estate sectors. Some loans have already been preemptively rescheduled for clients in good standing but facing temporary working capital needs. These thus do not show in NPLs. As regards concentration, the loan portfolio appears diversified, with total large exposures accounting only for 41 percent of Tier 1 capital.¹¹

¹⁰ For example, a global limit on retail lending of 150 percent of Tier I capital (now reduced), and the 125 percent risk weight on unhedged loans in FX.

¹¹ According to the NBS regulation, banks' large exposures are defined as exposures to a single person or a group of related persons amounting to at least 10 percent of the bank's capital. The NBS regulation limits individual large exposures to 25 percent of banks' Tier I capital and total large exposures to 400 percent of banks' Tier I capital.

Table 8. Serbia: Financial Soundness Indicators, 2006-June 2009

(in percent unless otherwise indicated)

	2005	2006	2007	2008	2009- H1
Capital Adequacy					
Regulatory capital to risk-weighted assets	26.0	24.7	27.9	21.9	21.2
Regulatory Tier I capital to risk-weighted assets	22.2	24.2	28.5	22.8	23.7
Capital to assets	16.2	18.5	21.0	23.6	23.3
Asset Quality					
Non-performing loans to total loans	...	...	...	11.3	16.5
Specific Provisions to Gross Non Performing Loans	...	...	...	56.9	46.6
Non Performing Loans net of provisions to Tier I capital	...	...	...	14.8	27.1
Loans to shareholders and parent companies to total loans	...	...	2.1	2.2	2.2
Large exposures to Tier I capital	82.5	49.6	46.1	36.6	40.7
Specific Provisions to gross loans	10.3	11.0	8.4	7.1	9.4
Profitability					
Return on Average Assets (ROAA)	1.1	1.7	1.7	2.1	1.0
Return on Average Equity (ROAE)	6.5	9.7	8.5	9.3	4.1
Net interest Margin to gross operating income 1/	...	...	...	...	61.8
Non-interest expenses to gross operating income 2/	...	...	...	...	88.9
Non-interest expenses to average assets	...	...	...	...	7.7
Personnel expenses to non-interest expenses	...	...	...	...	27.7
Liquidity					
Core Liquid assets to total assets 3/	30.5	40.7	37.3	30.3	30.3
Core Liquid assets to short-term liabilities	47.1	69.0	58.9	48.0	47.9
Liquid assets to total assets 4/	19.8	22.9	46.7	43.3	41.8
Liquid assets to short term liabilities	30.6	38.8	73.7	68.6	66.0
FX- denominated loans to total loans	19.0	15.2	15.7	11.8	9.1
FX- indexed loans to total loans	...	...	...	66.2	71.6
FX- deposits to total deposits	70.7	65.9	64.2	69.0	70.1
FX- liabilities to total liabilities	74.7	72.4	67.8	72.1	82.0
Deposits to assets	62.5	57.0	61.4	57.7	59.2
Loans to deposits	94.9	86.7	89.3	104.3	100.3
FX- loans to FX-deposits (including indexed)	...	...	...	113.3	110.7
Sensitivity to Market Risk					
Net open FX position (overall) as percent of Tier I capital	18.6	21.7	14.5	7.4	4.4
Off-balance sheet operations as percent of assets KA report 5/	26.4	41.0	49.2	56.2	49.1

Source: NBS

1/ Gross operating income in the calculation of this ratio excludes FX gains due to their volatility and distortionary impact.

2/ Similarly, non-interest expenses in the calculation of this ratio abstracts from FX losses.

3/ Cash, repo and mandatory reserve

4/ Sum of first- and second-degree liquid receivables of the bank (article 11 of Decision of Liquidity Risk Management)

5/ Includes only risk-classified off-balance sheet items

24. **Asset quality appears worse in private local banks and in majority state-owned banks than in foreign banks, reflecting weaker risk management.** NPLs reached 30½ percent in private local banks in June 2009, while the NPL coverage ratio was at 38 percent (lowest among peer groups) (Table 9). However, private local banks' CAR is higher due to their

relatively small balance sheets.¹² The four majority state-owned banks' NPL ratios were also higher than foreign banks' ranging between 28 and 55 percent. The authorities plan to deal with the four majority state-owned banks through mergers and restructuring. These banks are individually small and non-systemic, and their combined market share is 2.7 percent of the banking sector's assets.

Table 9. Serbia: Asset Quality and Profitability Across Peer Groups
(2009 H1)

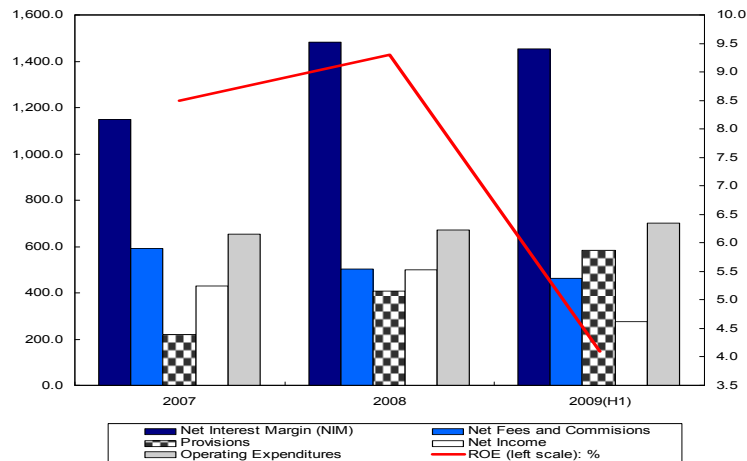
	State-controlled banks	Local private banks	Foreign banks	Total banks
Capital Adequacy				
Regulatory capital to risk-weighted assets	21.4	27.9	20.4	21.2
Regulatory Tier I capital to risk-weighted assets	22.0	34.6	22.9	23.7
Capital to assets	19.3	31.7	23.2	23.3
Asset quality				
Nonperforming loans to total loans	17.5	30.5	14.5	16.5
Specific Provisions to Gross Nonperforming Loans	59.2	37.7	45.7	46.6
Nonperforming loans net of provisions to Tier I capital	26.4	47.3	24.0	27.1
Loans to shareholders and parent companies to total loans	2.8	1.7	2.1	2.2
Large exposures to Tier I capital	55.6	55.3	35.6	40.7
Profitability				
Return on Average Assets (ROA)	0.2	2.2	1.0	1.0
Return on Average Equity (ROE)	1.1	6.7	4.3	4.1

Source: NBS.

25. **Profitability of the Serbian banking system has been generally low by regional comparisons (see Figure 7) partly on account of high capital and reserve requirements.** It has further declined in 2009 due to significant loan losses associated with increased NPLs. ROEs halved in June 2009 and stood at 4.1 percent (annualized) versus 9.3 percent in 2008. Net interest margins remain the main source of banks' profits and have been relatively stable with respect to loans. However, profitability is dampened by the large share of non-income generating assets (cash and reserves at the NBS), which currently stand at about 25 percent of total banks' assets due to high reserve requirements. There are 13 banks (with a total of 16 percent market share) which are currently generating significant aggregate losses. In terms of relative performance, state banks are the weakest, with an ROE of 1.1 percent.

¹² Aggregate stress test results show that local private banks hold sufficient capital buffers to withstand credit risk shocks. The mission did not perform stress tests on individual private local banks given their non-systemic importance.

Figure 6. Banking Sector Profitability Indicators
(in millions of U.S. Dollars unless indicated otherwise)

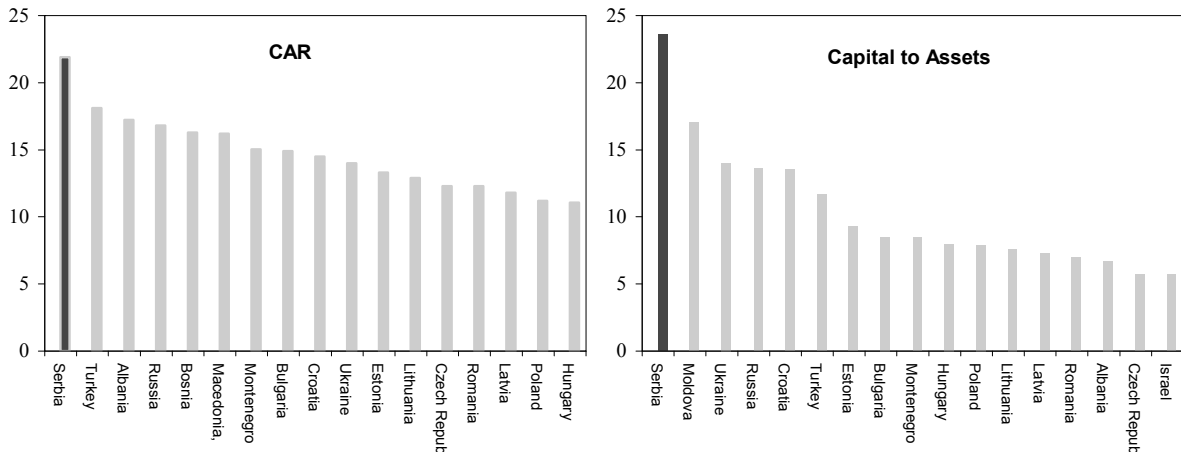


26. **The banking system is liquid, and a systemic liquidity crisis from interbank contagion appears unlikely.** Liquid assets accounted for a comfortable 42 percent of total assets (versus 47 percent in 2007), and covered 67 percent of short-term liabilities. Interbank positions are marginal. Also, the NBS can release large amounts of liquidity if needed by relaxing reserve requirements and letting the repo portfolio come due. Loans to deposits increased in recent years reflecting rapid credit growth, but this ratio declined in the first half of 2009 mirroring tighter lending conditions. Liquidity was effectively tested in October 2008, following a short-lived bank run during which 18 percent of the savings deposits (mostly retail) were withdrawn from the banking sector to “mattresses” and safe deposit boxes. To restore confidence, the authorities increased the amount of deposit insurance from EUR 3,000 to 50,000 and introduced several liquidity enhancing measures (see Technical Note on Systemic Liquidity). Parent banks’ deposits in their subsidiaries further helped banks withstand the liquidity shortage. Half of the withdrawn deposits have now reportedly returned to the banking sector.

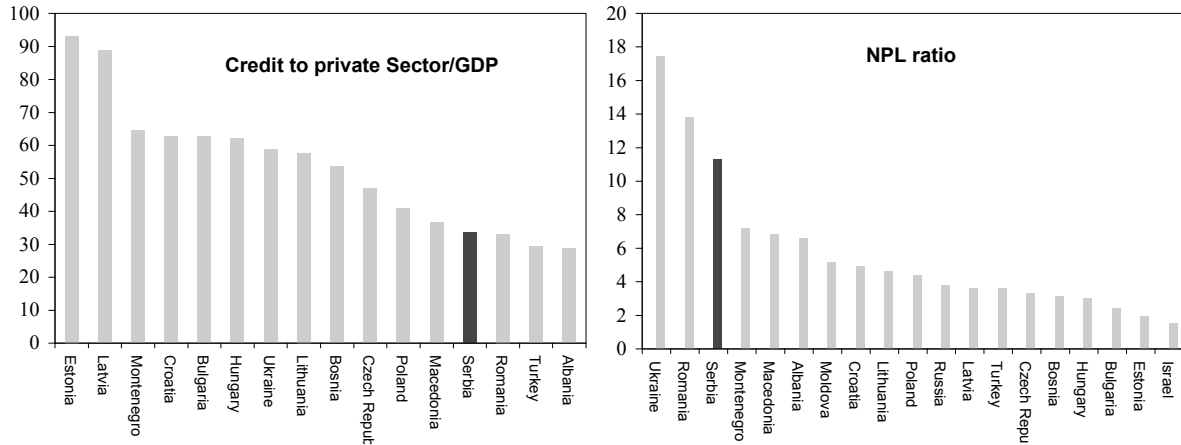
27. **The banking sector appears insulated against direct FX and interest rate market risks given the regulatory limits on FX net open positions, effective asset liability management, and the small trading portfolio subject to mark to market.** The overall net open position accounts for 4.4 percent of Tier I capital as of June 2009, and banks mostly had long positions which made them gain from RSD depreciation. The regulatory limit on net open position is 20 percent of Tier 1 Capital. The sensitivity of the banking sector to interest rates through net interest margins and duration impacts also appears under control given the duration match between assets and liabilities. Most loans are at variable rates while deposits are short-term, which makes them reprice in tandem.

Figure 7. Selected CESE Countries: Financial Soundness Indicators, 2008

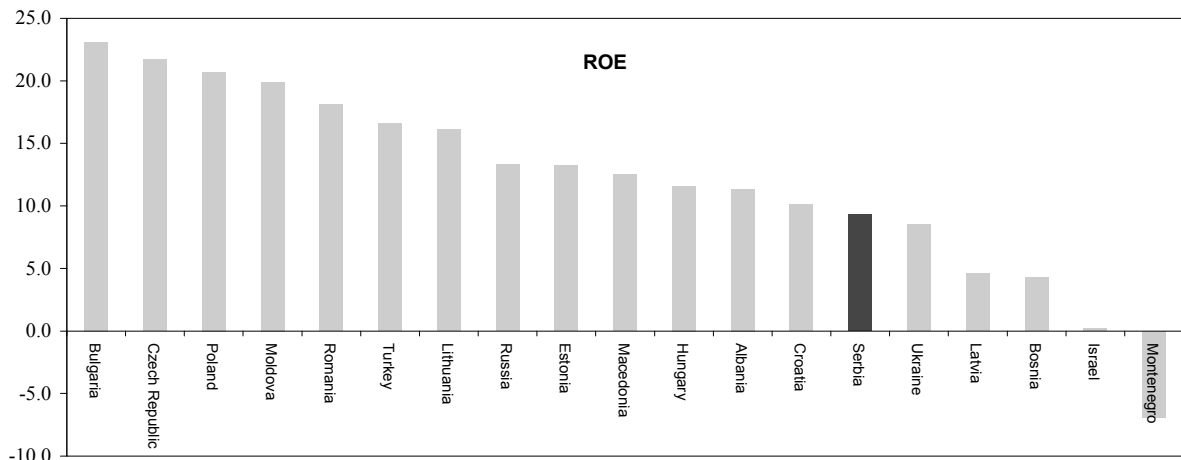
The banking sector is highly capitalized with above-average CARs and leverage ratios ...



However, bank intermediation is still low and the NPL ratio is significant and rising ...



While significant capital buffers exist, profitability as exhibited by ROE is low by regional standards.



Source: NBS and GFSR

V. STRESS TESTS

28. **As part of the Financial Sector Assessment program (FSAP) update, stress tests were conducted to assess the resilience of the Serbian banking sector to a set of extreme but plausible shocks.** The purpose of the stress tests was to examine the effect of shocks to various risk factors on the financial condition of banks. The tests covered market, credit, and liquidity risks, simulated through single- and multi-factor shocks. The calibration of the shocks was based on historical evidence from Serbia and cross-country banking crises, expert judgment, and the latest macroeconomic assumptions under the Fund program. The tests covered 15 largest private banks and one state-owned bank accounting for 84 percent of the banking sector's assets, in addition to four peer groups, namely (a) local private banks; (b) foreign banks; (c) state-owned banks; and (d) the consolidated banking sector.

29. **The credit risk stress tests methodology was consistent with the FSSP component of the Fund program and the regional Central, Eastern and Southern Europe (CESE) stress testing exercise.**¹³ However, key differences include (a) IFRS-based tests done for the FSSP were excluded in the FSAP and the CESE; (b) the FSSP focused on one adverse macro-scenario under the program as of May 2009 and allowed for profit buffers, while the FSAP includes an additional, more adverse macro-scenario, and reports results including and excluding profit buffers; and (c) the revaluation effect on FX risk-weighted assets was included in the FSSP and the FSAP but not in the CESE.

30. **As regards the calibration of shocks, elasticities linking key macroeconomic variables with credit risk were based on cross-country data and expert judgment.** Due to insufficient data to estimate Serbia-specific elasticities, assumptions were made using the elasticities from cross-country evidence collected from 51 banking crises in 54 countries over ten years between 1994 and 2004, the rules of thumb suggested by the CESE exercise, and expert judgment. The macro variables used included output gap, exchange rate, and interest rates changes, and their shock magnitudes were derived from the Fund program's downside macro-scenario in addition to an assumed full-blown crisis scenario by the FSAP mission. Table 10 summarizes the macro scenario assumptions and elasticities used to project NPLs with a one-year horizon. The calibration of market shocks was based on historical time series for Serbia and their tails of distributions where relevant, as well as shocks observed during crisis episodes in other countries (Table 11).

¹³ A concurrent stress testing exercise was carried out for participating countries in the CESE region. This exercise harmonized methodologies and assumptions as much as possible, for example, on linking macro scenarios with NPLs and on the use and assumptions of profit buffers.

Table 10. Downside and Crisis Macro Scenario Assumptions for Stress Tests

	Scenario 1	Scenario 2
Output gap (in percent of potential output)	-5.8	-5.8
Nominal euro exchange rate depreciation (% , eop)	12.0	25.0
Policy rate change (%)	0.1	8.0

31. **As regards the metrics, the impact was shown on regulatory capital, risk weighted assets, and CAR.** The change in CAR compared to the baseline was calculated, and the necessary capital injection to restore CAR to the minimum 12 percent was estimated as a percent of GDP. In credit risk stress tests, the losses consisted of increases in provisions; in exchange rate stress tests, they consisted of a revaluation gain or loss from net open positions and risk-weighted assets (RWA). In the macroeconomic scenarios, the present value of gains or losses as a result of the shocks was expressed as a charge to capital under two alternative measures: assuming no profit buffers and allowing for profit buffers assuming 100 percent retained earnings (see below). In the liquidity stress tests, the impact of deposit runs was evaluated on the ability of banks to service their liabilities through a fire-sale of their liquid assets with no access to external financing from parent banks or the NBS. The number of illiquid banks after each day of deposit run and their total market share of the banking sector was calculated as well as their net cash outflow as a percent of total assets.

A. Credit Risk

32. **Credit risk was assumed to be induced by a further contraction in output, pressures on the RSD as currency-induced credit risk (CICR), alongside with an increase in interest rates to support the exchange rate.** Most of the loans in Serbia are to unhedged FX-borrowers bearing variable interest rates. Assumptions were made to the elasticities linking NPLs with macroeconomic variables using cross-country data (see para. 29). Elasticities obtained from cross-country studies were based on regressions using NPL ratios (defined as loans where interest and principal payments are 90+ days overdue), while the Serbian provisioning regulation is based on risk classification of all balance sheet and off-balance sheet assets which are divided into five risk categories (A, B, C, D, E). The last two categories are those which include (albeit not exclusively) NPLs (90+ days definition above). These two categories were therefore those used in the stress tests as a proxy for NPLs (after some adjustments). The increase in NPLs was performed through a migration from categories A, B, and C, to categories D and E distributed proportionally according to banks' initial shares of NPLs in each one of these categories. Using the mid-points of the provisioning rates ranges for each asset category based on the NBS regulation, the additional NPLs were translated into additional provisions under each scenario.¹⁴ The methodology accounted for collateral deemed realizable, as recognized by the NBS, by reducing the loan base on which shocks were applied by the full amount of prime collateral

¹⁴ The NBS regulation allocates a range of provisioning ratios for each asset class. The ranges are based on the number of days overdue as follows: <30 days: 1-2 percent, 31-60 days: 5-10 percent, 61-90 days: 20-35 percent, 91-180 days: 40-75 percent, > 181 days: 100 percent.

(mostly cash), and 50 percent of adequate collateral (mortgages), which assumes a haircut on collateral values. During the discussions with banks, an argument was made that in times of depreciation, unhedged corporate borrowers may be able to raise prices to compensate for decreased debt service capacity. This was accommodated by assuming that 40 percent of the exchange rate shock can be passed through to prices in a time of crisis and the CICR impact is reduced proportionally.^{15 16} In order to account for falling demand in a time of crisis, the exchange rate pass-through was reduced by 75 percent in the stress tests.

33. **The credit risk stress tests were also applied to classified off-balance sheet items.** These constitute about a quarter of total off-balance sheet items, namely payment guarantees (including those against parent banks' direct lending to Serbian firms) and undrawn credit lines. The same migration methodology outlined above was applied.

34. **The main contributor to the increase in the NPL ratio was from CICR, followed by the widening output gap.** System NPLs increased by 13½ percentage points from June 2009 levels, of which over 10 percentage points were due to CICR and the widening output gap. The remainder of the increase in NPLs through the indirect impact of the interest rate channel was second-order in nature, at around 3 percentage points.

35. **The results suggest that banks currently hold sufficient capital buffers to withstand shocks.** In the most severe scenario, an increase in system NPLs of an additional 13½ percentage points from June 2009 levels did not result in severe undercapitalization in the large banks (Table 12). Some banks fell below the minimum required CAR of 12 percent after the shocks but most stayed above 8 percent. One bank that is currently in the process of recapitalization fell below 8 percent. The recapitalization needed to restore CAR to the minimum 12 percent did not exceed 0.7 percent of GDP. State-owned banks were more strongly affected than other groups. One small majority state-owned bank, which is already incurring losses and is in the process of a restructuring, loses its capital in the most severe scenario.¹⁷

B. Market Risks

Exchange rate risk

36. **In addition to the CICR discussed above, the direct market impact of an exchange rate depreciation on banks' FX net open positions and a revaluation of RWA was evaluated.** The RSD is a managed float with no predetermined path for the exchange rate.

¹⁵ Three-year average correlation between the RSD/Euro exchange rate and inflation is 0.6. The correlation was reduced to account for falling demand in a time of crisis.

¹⁶ The increase in the NPL ratio due to CICR was calculated as follows: $\Delta NPL = \alpha \cdot \chi \cdot (1 - 0.4\gamma)$, where α corresponds to the exchange rate shock, χ is the elasticity of the NPL ratio to the exchange rate, and γ is the share of corporate loans in total loans.

¹⁷ Reportedly, a strategic partner has been identified to acquire the bank.

Changes in the net open position have a direct impact on banks' gains/losses and the revaluation of FX assets has an impact on RWA.

37. **Results of the exchange rate risk stress tests suggest that the direct impact of exchange rate shocks are negligible on FX- net open positions given banks' marginal positions.** The FX net open position for the banking sector was 4.4 percent of Tier 1 capital as of June 2009. The generally limited impact is due to the regulatory restrictions limiting FX-net open positions to 20 percent of Tier I capital, and the long FX-net open positions most banks hold, which make them gain in the event of an RSD depreciation.

38. **The largest impact of the direct effect of FX shocks was felt through the impact on RWA following a revaluation of FX assets.** Banks' risk-weighted assets would increase significantly in the event of a large depreciation given the large FX-linked component and the high risk weights on unhedged FX loans (125 percent). This effect explains the negative impact on capital adequacy ratios in the range of 2-3 percent.

Interest Rate Risk

39. **The market risk impact of interest rates does not appear to be significant due to banks' adequate asset liability management and the marginal share of the trading portfolio in banks' balance sheets.** The impact of interest rates fluctuations on banks' net interest margins and duration mismatches could not be assessed due to the unavailability of data on time to next repricing buckets. However, the direct impact of interest rate stress tests does not appear significant given that most loans bear floating rates and reprice in tandem with short-term deposits. In addition, fixed income securities (excluding repo) constitute a marginal share of banks' balance sheet at 2 percent. Transformation risk, which could be significant given that most loans are long-term while deposits are short-term, is mitigated by the callability of loans before maturity. This is a standard credit covenant in all loans.

C. Macro Scenarios

40. **Stress tests combining credit and market risks were performed, representing two adverse macroeconomic scenarios.** The first corresponded to the downside scenario envisaged under the Fund program (as of May 2009), and could be plausible given the uncertain global economic outlook and the possibility of significant spillovers from adverse developments in other countries in the region. The scenario envisages that such spillovers would result in weaker growth and a higher output gap, some depreciation pressures, and broadly unchanged policy interest rates than in the program's baseline case (Table 10). The second assumes a full-blown crisis scenario with the same output gap, a plunge of the RSD along the lines experienced in late 2008, and a significant hike in policy rates.¹⁸ The shock magnitudes under this scenario were also guided by historical evidence from banking crises (Table 11). The macro-scenarios

¹⁸ The output gap was left unchanged between scenarios as it remained significantly larger than what has been observed so far.

accounted for projected profits, as these form the first buffers against credit risk losses. After-tax pre-provisioning profits were assumed at 60 percent of the 2008 level, consistent with the CESE and FSSP assumptions. Net income as of June 2009 was also included to take into account the financial situation as of 2009H1, and 100 percent retained earnings were assumed.

Table 11. Banking Crisis Indicators for Selected Banking Crises

Country	Timeframe	NPLs at peak (in %)	Insolvent banking assets at peak (in %)	Largest exchange rate depreciation	Largest annual increase in short- term interest rates	
				In %	In % points	Year
Argentina	2001–	20		232	16.8	2001
Bolivia	1994–		30	9	n.a.	
Brazil	1994–99	15	15	48	1710.2	1994
Costa Rica	1994–	32	90	18	n.a.	
Dominican Republic	2003			76	12.5	2004
Ecuador	1998–2001		65	197	n.a.	
Finland	1991–94	13	31	27	1.4	1990
Indonesia	1997–2002	70	35	95	35.0	1998
Jamaica	1996–2000			19	n.a.	
Japan	1991–	35		13	2.3	1990
Korea, Republic of	1997–2002	35		101	1.7	1998
Malaysia	1997–2001	30	14	54	0.9	1998
Mexico	1994–2000	19	19	71	44.5	1995
Norway	1990–93		85	16	3.1	1992
Paraguay	1995–2000		10	20	8.3	1998
Philippines	1998–	20		52	3.4	1997
Russia	1998–99	40	50	247	29.6	1998
Sweden	1991–94	13	22	27	6.6	1992
Thailand	1997–2002	33		85	5.4	1997
Turkey	2000–			72	35.2	2001
Ukraine	1997–98	65		81	18.4	1998
Uruguay	2002–	25		84	n.a.	
Venezuela	1994–95		35	61	n.a.	
Vietnam	1997–	18	51	13	n.a.	
Median value		28	33	58	8.3	

Sources: Honohan and Laeven (2005), IFS, and IMF staff estimates.

41. **Results of the macro-scenarios highlight the impact of credit risk, but do not show the potential need for large recapitalizations (Table 12).** The system CAR remains above minimum in both scenarios, excluding or including profit buffers, with the worst outcome reducing the CAR to 13.9 percent. The capital injection needed to restore the CAR of the 15 largest banks and state-owned bank to the minimum capital adequacy ratio of 12 percent is 1.2 percent of GDP under the full-blown crisis scenario, assuming zero pre-provisioning after-tax projected net income, and 0.4 percent of GDP allowing for pre-provisioning profits as described

above. This reflects the still low credit to GDP ratio in Serbia, and the very high capital buffers prior to the crisis. Stress test results of the banking sector mirror foreign banks' given their predominance.

**Table 12. Serbia: Summary Table for Stress Tests
(based on June 2009 data)**

	Number of banks 1/			State-owned banks		Local Private banks		Foreign banks		Total system		Recapitalization needs 2/	
	CAR <0	CAR 0-8%	CAR 8-12%	CAR	change (%)	CAR	change (%)	CAR	change (%)	CAR	change (%)	in RSD billions	in % of GDP
A. Baseline (before shocks)	0	0	0	21.4		27.9		20.4		21.2		0.0	0.0
B. Single Factor													
Credit Risk													
Increase in NPLs (Step-wise migration of loan portfolio) 3/	0	1	3	17.6	-3.9	26.7	-1.3	17.4	-3.0	18.2	-2.9	5.0	0.2
Increase in NPLs (Step-wise migration of loan portfolio) 4/	1	1	4	14.2	-7.2	24.5	-3.4	15.3	-5.1	15.9	-5.2	20.6	0.7
Market Risk													
Exchange Rate Risk													
Direct Impact of RSD depreciation on Net Open Position and RWA (12%)	0	0	0	20.6	-0.8	27.3	-0.6	18.7	-1.7	19.6	-1.6	0.0	0.0
Direct Impact of RSD depreciation on Net Open Position and RWA (25%)	0	0	1	19.1	-2.3	25.5	-2.4	17.0	-3.4	17.9	-3.2	0.3	0.0
C. Multi-factor scenario 5/													
Scenario 1 6/	1	0	0	18.8	-2.7	33.1	5.2	18.3	-2.1	19.6	-1.5	1.0	0.0
Scenario 2 7/ 8/	1	1	5	14.9	-6.5	30.4	2.5	15.3	-5.1	16.5	-4.6	10.7	0.4

1/ Of the sixteen individual banks subject to the stress tests, number of banks that fall below minimum requirements.

2/ Total Recapitalization need to restore the CAR of the banks covered by the stress tests to 12 percent.

3/ Increase in NPLs using the Fund program adverse scenario as of May 2009: increase in output gap (6.5%), RSD depreciation (12%) and increase of interest rates (0.1%). Migration of loan portfolio is from performing asset classes (A, B, and C) to non performing (D and E).

4/ Increase in NPLs using a crisis scenario: increase in output gap (6.5%), RSD depreciation (25%) and increase of interest rates (8%). Migration of loan portfolio as in footnote 2.

5/ Multi-factor scenarios take into account profit buffers. Without such buffers, more banks would become undercapitalized and the recapitalization need would be 1.2 percent of GDP.

6/ Combined impact of credit and market risks based on the program adverse scenario as of May 2009, see footnote 2.

7/ Combined impact of credit and market risks based on a crisis scenario, see footnote 3.

8/ Local private banks' CAR was higher than pre-shock because the profit buffers were larger than the losses.

D. Liquidity Risk

42. **A liquidity stress test was carried out to test banks' ability to withstand a deposit run over a period of five days without external financing.** The test was calibrated based on recent evidence on deposit withdrawals in Serbia. In October 2008, a deposit run occurred following which 18 percent of savings deposits were withdrawn from the banking sector over a 1½ month period. The liquidity stress test assumed daily withdrawals of 7 and 2 percent of household and corporate deposits, respectively, over a period of five days.¹⁹ Liquid and illiquid assets were assumed to be convertible to cash at 80 percent and 1 percent respectively, and the NBS was assumed to be willing to buy back government securities at a discount. Banks were assumed to have no access to external financing from parent banks, the interbank market, or lender of last resort during the five days.

43. **The liquidity test results showed that banks could withstand the shocks thanks to high liquidity buffers enhanced by high reserve requirements.** No banks became illiquid (Table 13). An additional test was performed assuming a withdrawal of parent banks' short-term exposures and the impact was measured against current assets to short-term liabilities ratio. No major impact was observed.

Table 13. Serbia: Summary Results of the Liquidity Stress Tests
(based on June 2009 data)

	Number of banks
Illiquid banks	
After day 1	0
After day 2	0
After day 3	0
After day 4	0
After day 5	0
Is there systemic illiquidity after day 5?	
Total state banks	no
Total domestic banks	no
Total foreign banks	no
Total banking sector	no

1/ Deposit run based on a daily withdrawal of 7 percent of retail deposits and 2 percent of corporate deposits for five consecutive days, assuming that 80 percent of liquid assets and 1 percent of illiquid assets can be converted into cash daily.

VI. MODELS USED BY NBS AND COMMERCIAL BANKS

44. **The NBS has made significant strides in its stress testing and modeling capacities.** The current macro-financial models mapping Probabilities of Default (PDs) of the corporate and

¹⁹ Corporate deposits are more difficult to be withdrawn in large amounts, as they reportedly require additional documentation.

household sectors with macroeconomic variables are steps in the right direction. The NBS has built separate macro-financial models to estimate unexpected losses for corporate and retail borrowers from adverse macroeconomic fluctuations (GDP growth, interest rates, exchange rates, credit growth). Sensitivity analyses are also adequate. Notwithstanding, data series are only available since 2007. Longer data series should therefore be built going forward to enhance the models' robustness.

45. **Correlation matrices of risk factors, calibration of shocks, and how these could be mapped out with macroeconomic scenarios could be further refined.** If the NBS can forecast the path of a set of macro-variables following exogenous shocks relevant to Serbia through a macroeconomic model at the central bank, these could be used in turn to model the impact on PDs using dynamic panel data regressions. The elasticities could then feed into the calibration of credit risk shocks. To this end, PDs and exposures by economic sector should be constructed bank by bank covering at least one economic cycle.

46. **As regards stress testing models used by banks, there is a great deal of divergence.** Most banks use sensitivity analyses which are conducted to some parts of the balance sheet. The risk factors used essentially are credit and liquidity risks (some large banks do not conduct credit risk stress tests). Macro financial models are rarely used by banks, and no bank has a comprehensive and mature stress testing framework yet, according to an NBS survey.

47. **Despite the positive results of the stress testing, the NBS should continue to closely monitor banks' exposures.** Special attention should be allocated to FX-linked loans, and loans to the most financially distressed corporate sectors (e.g., manufacturing). In addition, data on rescheduled and restructured loans should be closely monitored.

VII. SUMMARY AND RECOMMENDATIONS

48. **The banking sector is well capitalized and liquid, but the corporate sector's weak performance is a source of concern because of its adverse impact on NPLs.** An analysis of the corporate sector's financial soundness indicates that corporate activity, profitability, and solvency have significantly declined in the face of the current economic downturn, leading to a deterioration in the repayment capacity of borrowers. In addition, FX risk is significant for both the corporate and household sectors on account of high unhedged FX borrowing. As a result, any significant pressures on the exchange rate, combined with increased unemployment, could further jeopardize corporate and households' balance sheets and further worsen their debt servicing capacity. This effect has already caused NPLs in the banking sector to almost double since September 2008, to 16½ percent in June 2009.

49. **Stress tests indicate that banks are quite resilient to further adverse shocks, but they remain vulnerable to credit risk.** The results highlight that the banking system is most vulnerable to further exchange rate depreciation, through foreign currency induced credit risk, and a prolonged economic downturn. Such developments would likely result in a further tide of NPLs, jeopardizing the banks' ability to generate profits, eroding built-up reserves, and possibly

coming to threaten systemic stability. In this context, many signs are worrisome: a loss-making corporate sector, deteriorating profitability in banks, and little real credit growth.

Table 14. Serbia: Main Recommendations

Monitor NPLs closely, particularly in the manufacturing and processing industries

Monitor restructured loans

Ensure that majority state-owned banks are sufficiently strengthened before divestment, given their weak performance.

Enhance risk management in small private local banks.