BANK OF SLOVENIA ADJUSTMENT POLICY TO SURGES IN CAPITAL FLOWS

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Abstract:

The article presents an empirically tested assessment of the Bank of Slovenia (BS), national central bank, adjustment policy to surges in capital flows during the last decade. Exchange rate appreciation, undeveloped banking sector, immoderate money market oscillation, unstable economic trends (all phenomena that can also be found in other transition countries) are just some of the detrimental effects that can be provoked by surges in capital flows if the national economy is faced with some fundamental sectoral deficiencies. Empirical results indicated that BS quite successfully mitigated listed effects of excessive foreign currency inflows during the last decade. With the suitable combination of direct and indirect adjustment methods, BS succeeded in preventing, still vulnerable Slovenian economy from a major form of financial crisis and stronger nominal tolar appreciation (this was not the case in some other countries like Hungary, Poland, Czech Republic, Croatia) although there was some real appreciation.

Keywords: central bank policy, capital flows, exchange rate regime, appreciation, capital controls, problems of transition

JEL Classification: E58, F31, F32, F36, G18, C10, C13

1. Introduction

Slovenia is one of the smallest transition countries, established in 1991. It was then that its currency, named tolar, also emerged. Like most transition countries Slovenia got its share of foreign capital in the nineties, although because of some specifics (like relative smallness, administrative barriers, slow development of capital market) has not faced such enormous flows of equity capital as some other transition countries (e.g. Hungary, Czech Republic, etc). The majority of foreign capital flows came to Slovenia through debt instruments, which increased Slovenia's external indebtedness and forced the Slovenian central bank to take measures to mitigate negative influences of surges in foreign capital flows through the capital account on national economy.

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The basis for foreign capital flows observations is the balance of payments. In spite of a short history of Slovenia's capital market the movements of foreign capital can be divided into a few periods regarding their peculiarities. Bole (2001) states that in the last ten years four major changes on the balance of payment structure happened, and in accordance with this BS was forced to take measures. The first change happened immediately after Slovenia independence, when in the end of 1992 a surplus of the current account considerably decreased from 7.4 % of GDP in 1992 to 1.5 % of GDP in 1993.

Table 1
Net Foreign Currency Inflows into Slovenia (in USD mill.)

	1992	1993	1994	1995	1996	1997	1998	1999	2000
GDP	12.523	12.673	14.386	18.744	18.878	18.208	19.585	20.071	18.167
Current account	926	192	573	-99	-31	-11	-147	-783	-594
Net capital inflows[1]	54	454	450	513	871	666	347	650	1.055
International reserves	-71.8	-451	-328	-202	-339	-599	-29.5	-29.5	-241
International reserves (BS)	-633	-111	-641	-237	-587	-1.287	-158	-81.1	-179
As % of GDP									
Current account	7.39	1.52	3.98	-0.53	-0.16	-0.06	-0.75	-3.90	-3.27
Net capital inflows	0.43	3.58	3.13	2.74	4.61	3.66	1.77	3.24	5.81

1) Net capital inflows = (increase in reserves + statistical error) – current account balance.
Source: BS Monthly Bulletins, BS Annual Reports.

Net foreign currency inflows in 1992 were small (0.4 % of GDP) and international reserves increased mostly because of the surplus in the current account (by 6 % of GDP). Foreign debt was quite modest and it increased by negligible USD 37 mill. During 1993 and 1994, Slovenia still had substantial current account surplus due to considerable export of services (1.5 % of GDP in 1993 and even 3.9 % of GDP in 1994). Foreign direct investments reached around 1 % of GDP each year while foreign portfolio investments were almost totally absent, similarly to outflows of capital. The majority of net foreign currency inflows (3 – 3.5 % of GDP each year) were due to resident's deposits of foreign currency and net selling of foreign currency in exchange offices. During this period Slovenian enterprises started to run into foreign debt substantially (foreign debt increased in 1994 by USD 327 mill.), while consequently international reserves amounted to USD 2.8 billion, which represented 122 % of foreign debt. In the third period, during 1995 to 1998, for the first time in its history current account deficit emerged in Slovenia. Small (the account was almost balanced, see Table 1) deficit was manly due to external reasons.

Three main reasons for greater indebtedness of Slovenian banks and enterprises were: lower risk premium, high domestic interest rate and lightening of foreign debt access. External indebtedness rose to USD 5 billion or around 25 % of GDP in

1998, which means that Guidotti-Greenspar rule was violated (external debt to foreign reserves ratio fell to 97 %). Next to the current account deficit during this period, Slovenia was also faced with enhanced foreign currency flows through FDI that increased by USD 1 billion. FDI share in total GDP represented 14.1 %, but that was still much less than in some other transition countries like the Czech Republic (25.5 % of GDP), Estonia (35 % of GDP), Hungary (39 % of GDP). International reserves reached the highest point of USD 4.8 billion.

The last period is the period from 1998 up to the present time. Current account deficit rose further (in 1999 it represented almost 4 % of GDP, in 2000 3.3 % of GDP) and so did indebtedness. In the end of 2000, external debt amounted to USD 6.1 billion, which exceeded the amount of international reserves by almost 30 %. Term structure of foreign debt was adequate (on average 10.5 years in 1999) and the long-term debt comprised the majority of it. Net capital flows were extremely high [1] (USD 650 mill. in 1999 and even USD 1.055 mill. in 2000), but they did not cause such problems to the BS policies as in previous years. Major part of them were non-trade related loans taken abroad by banks and enterprises, while FDI represent only their smaller part (they reached only USD 162 mill. in total in 1999 and 2000).

Table 2
**Structure of Net Capital Flows in Slovenia** (in USD mill.)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
FDI (inflows)	111	113	128	178	194	375	248	181	181	188
FDI (outflows)	1.8	1.3	2.9	5.1	-6.3	-35.6	1.7	-37.7	-47.6	-24.4
Portfolio (inflows)[1]	-8.9	3.1	-32.5	-13.5	637	236	89.6	354	189	420
Loans from abroad	37.2	161	327	566	-7.5	332	272	772	936	215
Deposits/exchange offices	9.2	86.7	232	142	36.7	151	89.1	-223	15.7	-24.1
As % of GDP										
FDI (inflows)	0.89	0.87	0.89	0.95	1.03	2.06	1.27	0.90	0.99	1.00
FDI (outflows)	0.01	0.01	0.02	0.03	-0.03	-0.19	0.01	-0.18	-0.26	-0.13
Portfolio (inflows)	-0.06	0.02	-0.22	-0.07	3.37	1.29	0.46	1.76	1.04	2.31
Loans from abroad (total)	0.29	1.27	2.27	3.02	-0.04	1.83	1.39	3.84	5.15	1.17
Deposits/exchange offices	0.04	0.67	1.61	0.76	0.19	0.83	0.45	-1.11	0.09	0.13

1) For a clearer view we should deduct government bond issues in 1996 (USD 786 mill.), 1997 (USD 228 mill.), 1998 (USD 557 mill.), 1999 (USD 438 mill.), 2000 (USD 385 mill.), 2001 (USD 496 mill.).
Source: BS Monthly Bulletins, BS Annual Reports.

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1) Increase in net capital flows was the consequence of domestic institutional changes, especially a move towards free capital market through signing EU Association Agreement and the adoption of a new Foreign Exchange Law in June 1999.

Figure 1
Net Flows of Foreign Currency (monthly dynamics, as % of GDP)
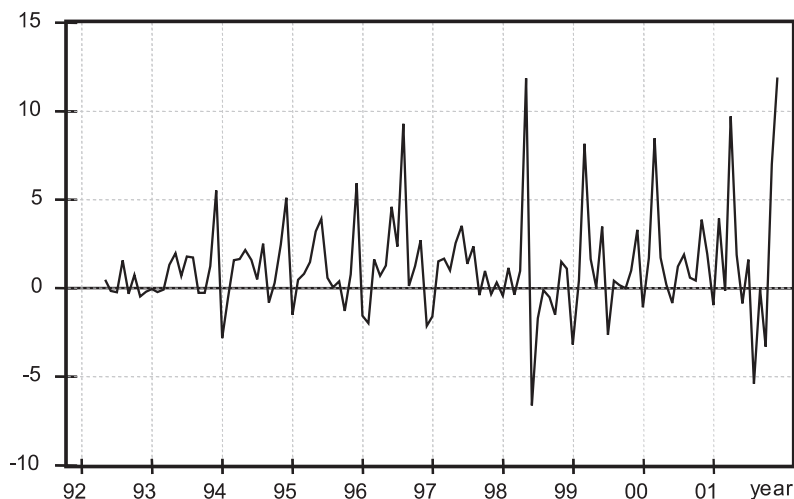
Foreign currency inflows through portfolio investments were mostly caused by issues of government bonds, while portfolio equity investments in securities were almost absent (USD -16 mill. in 1999 and USD 25 mill. in 2000).

Table 3
International Investment Position of Slovenia (in USD mill.)

on 31st December	1994	1995	1996	1997	1998	1999	2000
Assets	5,899	6,798	7,125	7,719	8,458	7,787	8,214
Liabilities	5,121	6,301	7,625	8,017	9,434	9,790	10,553
Net	777	497	-499	-297	-976	-2,003	-2,339
As % of GDP							
Assets	41.0	36.3	37.7	42.4	43.2	38.8	45.2
Liabilities	35.6	33.6	40.4	44.0	48.2	48.8	58.1
Net	5.40	2.65	-2.65	-1.63	-4.98	-9.98	-12.88
FDI (abroad)	2.46	2.61	2.43	2.52	3.11	3.01	4.37
FDI (in Slovenia)	9.22	9.41	10.58	12.12	14.12	13.23	15.46
Portfolio (abroad)	0.43	0.56	0.49	0.31	0.25	0.31	0.39
Portfolio (in Slovenia)	0.62	0.56	6.03	7.01	7.25	8.19	9.74
Foreign loans	13.02	12.62	12.92	13.45	14.86	16.02	20.49

Source: BS Monthly Bulletins, BS Annual Reports.

Table 4
External Debt and International Reserves Data (in USD mill.)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001[1]
External debt (EDT)	1,741	1,873	2,258	2,970	3,981	4,123	4,915	5,400	6,217	6,107
Long-term debt (LDOD)	1,659	1,744	2,172	2,916	3,931	3,988	4,915	5,400	6,217	5,972
Debt service (LTDS)	418	414	480	739	936	921	1,536	846	1,034	288
International reserves (total)	1,164	1,567	2,763	3,426	4,124	4,377	4,781	4,115	4,370	4,564
Principal ratios										
International reserves/ EDT (in %)	66.8	83.6	122.4	115.3	103.6	106.2	97.3	76.2	70.3	71.4
International reserves /import (months)	2	2.5	4	3.8	4.5	4.8	4.9	4.2	4.4	—
Term structure of EDT (years)	4.6	6.3	8.6	6.5	6.5	7.1	7.5	10.5	7.6	6.9
Debt in %										
External debt (as % of GDP)	13.9	14.8	15.7	15.8	21.1	22.6	25.1	26.9	34.2	—
Public and publicly guaranteed	72.5	69.2	61.3	49.3	50.8	50.5	47.3	45.4	42.9	44.0
Private non-guaranteed	27.5	30.8	38.7	50.7	49.2	49.5	50.4	52.4	55.5	55.9

1) Till May 2001.
Source: BS Monthly Bulletins, BS Annual Reports.

2. Foreign Capital Flows Adjustment Policy in Slovenia

Almost from the beginning Slovenia was facing large foreign currency inflows that had, due to Slovenian's relative smallness and openness, potentially quite a few detrimental consequences. In such circumstances, consequences of surges in capital flows are even more harmful, especially due to intensive restructuring processes that were taking place. Due to that, ordinary measures for the neutralization of negative effects of capital inflows were adjusted to the development of institutional infrastructure and to the process of ownership transformation. In the latter case any major role of foreigners was not anticipated. At the beginning, the major instrument for fighting with surges in capital inflows was sterilization, but shortly afterwards the BS expanded its range of used instruments and it imposed more direct forms of restrictions.[2] Two main independent variables that the BS used to manage increased capital inflows were money supply and exchange rate.

2) For transition economies large capital inflows are more harmful than for the others, because of the absence of some specific conditions that mitigate detrimental effects of surges in capital inflows. Specific

The most frequent measures used to neutralize detrimental effects of surges in capital inflows were: interventions in the foreign exchange market through purchases and sales of foreign exchange and the use of conditionality mechanisms, sterilization policy through open market operations, prescribing foreign exchange minimum, prescribing mandatory reserve rates, prescribing net daily foreign exchange position, regulation for banks to balance their claims and liabilities in foreign currency (open foreign exchange position), custody accounts and restrictions on borrowing abroad (tolar deposits on foreign financial loans). Listed measures were certainly only "the second best solution" in the process of adjustment to surges in capital flows, due to the distortions in the financial sector and some other sectorial under-developments. The first best solution would be direct strengthening of some weakest points in the national economy (see Bole, 2001; Dooley, 1995). The combination of adjustment measures has been significantly changing over the observed period. It has been adjusted to changes in capital flows dynamics and structure as well as to costs caused by using instruments.

We divided ten years' period of capital flows into four periods with their characteristics, and similarly into four different periods taking into account various combinations of instruments and measures used. Survey of separate periods and instruments used in those periods can be seen in Figure 2.

Figure 2
Survey of Adjustment Measures used by Bank of Slovenia between 1992 and 2001

Period 1			Period 2		Period 3		Period 4		
Modest use of adjustment measures, relatively closed capital market			Increased use of adjustment measures, borrowing abroad oriented restrictions		The most intensive use of adjustment measures and especially restricted capital market		EU association agreement signed, low adjustment needs, intensive process of capital market liberalization, new foreign exchange law adoption		
1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
			Deposits on foreign financial loans						
				Open foreign exchange position					
					Custody accounts on foreign portfolio investments				
BS interventions in the foreign exchange market through purchases and sales of foreign exchange and use of conditionality mechanisms, sterilization policy through open market operations									
Prescribing foreign exchange minimum, prescribing mandatory reserves rate									

Source: BS Annual Reports.

The first period (between 1992 and 1994) was the period of surplus in the current account balance and the period of external equilibrium. The mobility of foreign capital was low and liquidity risk premium still high enough to prevent some detrimental surges in foreign (especially debt) inflows. The majority of inflows came through household sector and export and a minor part through FDI and external borrowing. In that period costs of sterilization were relatively low. Next to sterilization the exchange rate was controlled by periodical purchases and sales of foreign currency and regulations like foreign exchange minimum. With listed measures, the BS increased absorption of foreign currency in residents' portfolios and high liquidity risk premium still represented a barrier for non-residents to buy foreign currency bills. Due to the already stated reasons the BS was still able to raise yield on foreign currency bills without excessive costs to absorb surpluses. The main instruments within sterilization were treasury bills.

The second period was the period between 1995 and 1996. Liquidity risk premium fell and potential mobility of foreign capital rose. Residents got an easy access to relatively inexpensive long-term foreign loans. In addition, capital inflows through portfolio investments started to rise. During this period adjustment process to surges in capital inflows with regular instruments became more and more inefficient and expensive. Due to these the BS started to introduce some more direct measures of capital flows restrictions. In February 1995, the BS introduced an interest-free deposit of 40 % in tolar counter-value on all drawdowns under non-trade related loans taken abroad with maturity of less than 5 years. This measure was later amended many times in line with the current capital market situation. The costs of open market instruments and sterilization rose further.

The third period in adjustment policy to surges in foreign capital flows started at the end of 1996, and in the beginning of 1997 and it lasted until February 1999, when Slovenia signed an Associated Agreement with the EU. A few months later a new foreign exchange law was adopted through which access of residents to foreign loans was even easier and consecutively increased foreign currency inflow. Additionally, portfolio investments in Slovenian's equity securities were accelerated. The BS introduced the so-called open foreign exchange position to stimulate capital outflows. The later was of especial importance, while capital inflows were very low and mainly concentrated on debt repayments and commercial credits. Through this instrument banks were forced to balance their claims and liabilities to foreign persons to protect themselves against foreign exchange risk. At that time also the so-called custody accounts were introduced. This capital control imposed by the BS on foreign portfolio investment forced foreign portfolio investors to purchase securities via brokers or domestic banks to the debit of custody account open with one of the authorized banks against payment of custody fee. Although some antagonist of this instrument argued that this instrument totally stopped foreign investment activity in Slovenia during 1997 and 2001 it is evident that long-term foreign investors were actually shielded from external short-term distortions.

The fourth period started at the same time as the Association Agreement between Slovenia and the EU came into effect (February, 1999). The Agreement obligated Slovenia to fully liberalize some forms of capital flows (e.g. FDI) and allowed a transition period for deregulation of the rest (e.g. purchase of foreign securities for residents, some cash business, etc). In line with the Association Agreement also the new Foreign Exchange Law was adopted (in June, 1999). Consecutively adjustment measures to restrict free capital flows became quite bounded and limited to a six months period.

3. Assessment of Adjustment Policy Measures

The framework for assessment of adjustment policy measures to surges in capital flows, used by the Slovenian central bank during the last decade, is the rate of tolar appreciation and the influence of foreign capital inflows on base money. This is so because almost all adjustment measures to manage excessive capital inflows to Slovenia were aimed at exchange rate dynamics.

The prevailing idea in present theory (see Edwards, 2000; Reinhart, Smith, 1997) is that eligibility assessment of adjustment policy to surges in capital flows is rather an ungrateful job especially due to intersection of effects of adjustment instruments and other economic policy instruments used simultaneously. Adjustment policy to excessive capital inflows is usually implemented during major institutional changes in national economy (this was the case in transition countries and also in Slovenia) or during the period of intensive economic and technical development (this was the case in countries in Latin America and countries of South-East Asia). If we, however, want to get an answer about eligibility of adjustment policy measures that the BS used in Slovenian economy than we have to find answers to the following questions:

a) was the BS successful in preventing most of detrimental effects of surges in capital flows in Slovenia during the last decade? That means that the value of local currency was consistent with exchange rate policy goals, i.e. tolar exchange rate was in accordance with current account dynamics and it was not a consequence of capital account dynamics. It is a question if the BS succeeded to isolate exchange rate dynamics from oscillations in capital transactions. Next, it is very important if the base money increased within the range of monetary policy goals or its dynamics was somehow influenced by surges in capital flows;

b) did "direct methods" within the range of adjustment policy instruments, as open foreign exchange position, custody accounts, restrictions on borrowing abroad, foreign exchange minimum, used by the BS, significantly contribute to foreign capital flows regulation and did the listed measures really support indirect methods used to reduce tensions on exchange rate and base money dynamics?

In order to answer those questions some empirical analysis has been carried out. We wanted to find out if exchange rate dynamics and base money growth rate were influenced by capital account oscillation. In a detailed empirical analysis we examined mutual interaction among some variables: nominal and real exchange rate growth, base money growth rate, current and capital account dynamics, international reserves dynamics, purchase and sales of tolars and foreign currency treasury bills and some most frequently used direct measures included in the econometrical model like dummy variables.

First, Granger causality test has been carried out to establish interdependence of various listed variables. The main question was if the BS, with its adjustment policy succeeded to "isolate" major economic variables, such as exchange rate and base money growth rate, from oscillations in capital accounts. Thus we got some preliminary suitability assessment of used indirect adjustments methods. For more exact suitability assessments of "indirect adjustment methods" and also for suitability assessment of "direct adjustment methods" historic regression analysis has been done, accompanied by some other empirical observations with which we wanted to confirm the suggested hypotheses:

a) the BS was applying such a combination of "indirect" adjustment measures to manage surges in foreign capital flows. It succeeded in preventing extensive detrimental effects of foreign currency flows on exchange rate and base money growth

rate. Net capital inflows therefore had no statistically significant influence on dependent variables;

b) the BS has succeeded in reducing extensive surges in foreign capital flows by using eligible combination of "direct" adjustment measures. During this period, they had detrimental effects on tolar's external value and base money growth rate. Indirect adjustment measures, divided into: foreign debt capital inflows oriented restrictions and foreign equity capital inflows oriented restrictions had no statistically significant influence on listed dependent variables.

Granger causality test results are given below (see Table 5) for pairs of dependent and independent economic variables later used in econometric regression analysis. The hypothesis is verified on quarterly data with four lags included. Numbers found in Table 5 represent F-statistics. The null hypothesis, verified with F-statistics, is that x does not Granger-cause y and that y does not Granger-cause x. If values of F-statistics are high (above 2.10), the null hypothesis can be rejected. So it is an implicitly accepted hypothesis that the "result" depends on the "cause", while F-statistics do not indicate direction of positive or negative variable interconnections.

Table 5
Granger Causality Test Results

		Consequence (result)												
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
cause	(1)	*	0.4	0.4	0.4	0.9	0.5	0.3	1.1	0.3	1.6	1.9	1.6	**2.4**
	(2)	0.3	*	1.3	0.6	0.8	1.2	0.3	0.2	0.6	0.4	0.4	0.5	0.2
	(3)	**2.3**	**2.7**	*	0.9	**4.9**	**2.5**	**6.1**	2.0	1.5	1.7	1.8	**3.1**	1.7
	(4)	1.9	**2.5**	0.5	*	**2.7**	**2.7**	**4.2**	1.7	2.0	0.8	1.5	**3.4**	1.6
	(5)	**2.1**	0.9	0.4	0.3	*	0.6	0.7	**2.7**	0.6	**4.1**	1.0	1.3	**3.1**
	(6)	1.7	1.8	**2.9**	1.2	**3.6**	*	**4.2**	**2.2**	**2.8**	1.6	1.4	**2.1**	**2.6**
	(7)	**3.9**	0.3	**2.2**	0.6	1.3	1.4	*	**3.2**	0.2	1.8	1.6	0.1	**2.6**
	(8)	1.3	0.5	0.5	0.4	0.2	0.1	**3.2**	*	**2.2**	**3.2**	1.3	1.8	1.3
	(9)	0.4	**5.5**	1.3	1.1	1.0	**2.8**	0.7	0.5	*	0.4	0.4	**2.5**	0.1
	(10)	**3.9**	1.4	**2.0**	1.8	0.8	**2.9**	**2.8**	**6.7**	0.6	*	1.9	0.9	**5.9**
	(11)	**4.6**	0.3	0.1	0.3	0.1	0.5	0.8	0.6	0.8	1.2	*	2.0	0.9
	(12)	**4.4**	1.6	**2.4**	**2.2**	0.9	**2.3**	**2.2**	0.9	1.3	**2.9**	**4.1**	*	**3.5**
	(13)	1.9	0.3	1.9	0.8	0.4	0.8	**2.8**	1.6	0.6	**2.4**	1.6	0.7	*

(1) GDP – gross domestic product (2) BSL – the BS loans to banks
(3) TBT – treasury bills of the BS (total) (4) TBFC – foreign currency treasury bills
(5) LL – liquidity loans of the BS (6) IRBS – the BS international reserves
(7) FCD – foreign currency deposits (8) IIE – import of investment equipment
(9) NCI – net capital inflows (10) CAB – current account balance
(11) PI – price index (12) ERSIT – tolar exchange rate
(13) M0 – base money

Granger causality test indicated some significant connections between tested variables. Some of them were expected while for others adequate explanation cannot be found. As the most "dependent" among the listed variables are: GDP, international reserves, base money. They were caused by almost 6 or 7 variables. Results of connections between net capital inflows and current account balance as causal variables and base money and tolar exchange rate as caused variables indicated that net capital inflows did not cause tolar exchange rate (F-stat.: 2.5). Current account balance caused base money growth (F-stat.: 5.9) but it did not have any significant influence on tolar exchange rate (F-stat. 0.9). Next, we observed interconnections of variables that expose application of adjustment policy instruments with variables of tolar exchange rate, base money and current account. Results confirmed eligibility of adopted adjustment policy. Treasury bills were influenced by the BS international reserves changes and by current account balance. Changes in base money were caused by liquidity loans of the BS, while tolar exchange rate oscillations were caused by oscillations in the BS international reserves, treasury bills of BS and foreign currency treasury bills. Next, interesting connections between BS loans to banks and issued treasury bills and issued foreign currency bills were discovered. The later could indicate that banks started to shift their assets in more profitable BS securities while their current liquidity was assured by the BS liquidity loans. This should point to some external effects produced by the BS open market operations.

Additional empirical analyses and regression assessments. In this section, we made some empirical analyses and raised some econometric models to additionally reject or confirm hypotheses suggested above. As a theoretical framework to observe correlations between some main economic variables, the following models were used:

a) Cagan's money supply theoretical model (1956)[3];

b) various models that illustrate facts and causes of capital flows;

c) Dornbusch (1976) extended model of balanced exchange rate in terms of fixed prices and open economy.[4] The latter was used as a theoretical framework for nominal exchange rate response observation on net capital inflows in Slovenia.

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3) Cagan's theoretical model of money and inflation can be treated as a special case of LM curve, where m represents money supply and p price level in a national economy. The money supply should in total be dependent on the expected growth of prices. Linear form of Cagan's model can be written down (logarithmically) as: $m^d_t - p_t = -\eta \delta_t (p_{t+1} - p_t)$ Cagan's model specification is a simplified form of Keynes-Hicks's (1936) LM curve. A final form of Cagan's model in a small open economy, with moderate inflation and money demand dependence on nominal interest rate and real product can be put down as: $M^d_t - p_t = -\eta i_{t+1} + \phi Y_t - \eta \delta_t (p_{t+1} - p_t)$, where $i = \log(1 + i)$, p is logarithm of price level and Y logarithm of real product. On the other side there is regulated money supply that is in the case of the absence of all money market operations, influenced by purchases and sales of foreign currency that come into economy through current or/and capital transactions. As an origin of base money, M0 specification aggregate balance of monetary authorities was used. This is a balance of base money creation that enables the easiest analysis of money supply (M^s) causes. Those determinants are: transaction flows with banks, current account flows, capital account flows, demand on budget money.

4) For our purpose Dornbusch's exchange rate model was used, more precisely, his money theory of short-term rigid prices in the case of open economy. It tries to explain exchange rate movements as a consequence of money market changes. It argues that exchange rate oscillations are influenced by different adjustment speed of goods and capital markets on external shocks. While capital markets adjustments is almost immediate the adjustment of goods markets is slow due to rigidity of prices. Model is based on the presumption of the existence of small open economy, imperfect substitution of domestic and imported goods and perfect substitution of domestic and foreign securities. Dornbusch's monetary theory of exchange rate consists of the system of the following functions: uncovered interest-rate parity function, Dornbusch function of domestic product and Cagan's money market equilibrium function. The model is suitable for Slovenian circumstances as it presumes that domestic price level exceeds external price level and that

Econometric analysis of net capital inflow influence on M0 growth rate. First we observed if the increase in the BS international reserves were compensated with open market policy instruments in such an extent that the influence of net capital inflow on the base money growth rate was eliminated. Even in the absence of some strong empirical analysis this can be noticed from Figure 3, which represents the dynamics of the BS international reserves, in comparison with the dynamics of treasury bills issue. The difference between listed variables and the dynamics of base money which derives from the BS loans to banks (curve in the middle), clearly shows "intervention canal". The latter would be changed in excessive base money with all of their consequences on national economy, in the absence of the Bank of Slovenia adjustment policy. Coefficient of correlation between the BS international reserves and treasury bills was 0.98.

Figure 3
Foreign Currency Sterilization with the Bank of Slovenia Treasury Bills (in tolar bill.)
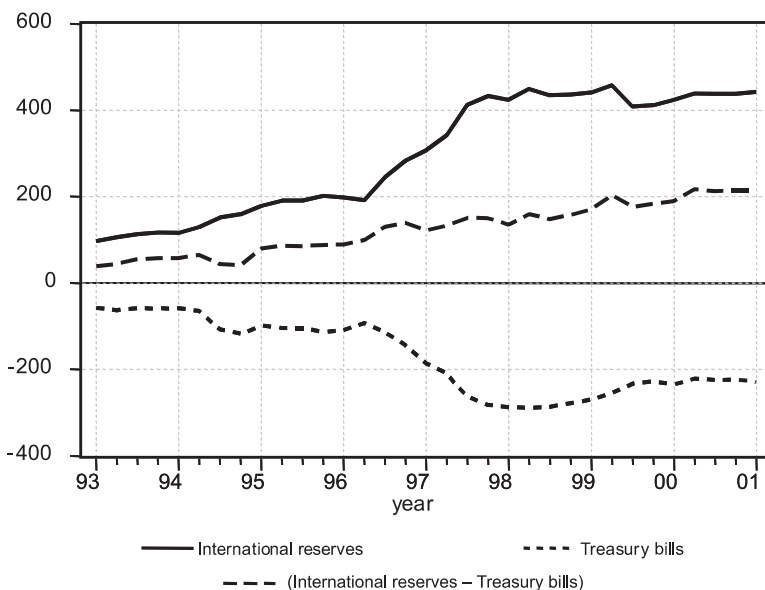
Source: BS Monthly Bulletins data base.

Furthermore, it was assessed whether the difference between "actual" base money, M0, and "required" base money supply, M0req, was influenced only by current account balance or also by net capital inflows. "Required" base money supply, M0req, that derived from money demand function, was evaluated as:

$$M0req = (1/m')^* M1$$

depreciation of domestic currency indicates the shift of domestic consumption from goods of tradables sector to goods of non-tradable sectors. It can be derived from the model that the difference between domestic and foreign interest rate is inversely proportional with domestic exchange rate depreciation. With the support of present model we will analyze response of nominal exchange rate, tolar exchange rate as a dependent variable on net capital inflows, and net capital inflows as an independent variable.

where m' is average multiplicator of Slovenian economy, evaluated as M1/M0 and amount 1.95 in the analyzed period. Money demand function, M1 is defined as:

$$M1(t) = C(t) + \alpha*GDPNOM(t) + \chi*Ir(t) + \delta*FCD(t) + u(t)$$
$$\qquad\qquad (9.954) \qquad (-1.465) \quad (-2.414) \qquad\qquad R^2 = 0.99 \quad \text{DW-coef.: } 1.85$$

where M1 – money aggregate M1, Ir – Slovenian bank deposits interest rate, GDPNOM – Slovenian GDP at current prices, FCD – foreign currency deposits.

Coefficients in parenthesis represent t-statistics of used variables. After M1 was evaluated, we accounted M0req and made a regression assessment of determinants of the difference between "actual" and "required" base money supply d(M0-M0req):

$$d(\text{M0-M0req})(t) = C(t) + \alpha*CAB(t) + \beta*NCI(t) + \delta*LL(t) + u(t)$$
$$\qquad\qquad\qquad (+3.600) \quad (-1.145) \quad (+1.838) \quad R^2 = 0.64 \quad \text{DW-coef.: } 2.00$$

where CAB – current account balance, NCI – net capital inflows, LL – BS liquidity loans.

The results indicated that net capital inflows did not have a significant influence on the difference between "actual" base money and "required" base money supply. The sign before t-statistic was negative. The latter shows that purchases of a "very profitable" BS treasury bills in some period became even detrimental for the liquidity of the economy, especially during 1994, when the BS had to intervene with some additional liquidity loans to banks. Generally base money supply followed the money demand and the dynamics of current account. Due to this we can assess that the BS indirect adjustment measures as suitable and effective. Chow stability test of the assessed model showed normal stability of the model, thus we can assume that there were no model specification errors.

Furthermore, historic regression was carried out to estimate effectiveness of "direct" methods of adjustment to surges in capital flows, used by the BS during the last decade. Direct methods, like prescription of foreign currency minimum, open foreign exchange position, deposits on foreign exchange loans and custody accounts were directed towards reducing immoderate indebtedness. All, except the last listed instrument, were directed towards debt capital inflows, while the latter was directed toward the so-called hot money known as foreign portfolio investments. Listed instruments were introduced into the model of net capital inflows as dummy variables. Instruments directed towards debt capital were denoted as debt capital dummy (DCD) and instruments directed towards portfolio transactions as portfolio capital dummy (PCD). Net capital inflow function is defined as:

$$NCI(t) = C(t) + \alpha*GDP(t) + \beta*IIE(t) + \chi*DCD(t) + \delta*PRIV + \varepsilon*PCD + u(t)$$
$$\qquad\qquad (+2.543) \quad (+1.121) \quad (-1.314) \quad (+1.448) \quad (-0.402)$$
$$R^2 = 0.62 \quad \text{DW-coef.: } 1.89$$

where IIE – import of investment equipment, PRIV – abbreviation for privatization represents some institutional changes in Slovenia (transformation of public ownership of firms to private ownership). The rest of abbreviated variables has already been explained.

The results have indicated that the introduction of some direct methods, namely restrictions on debt capital has significant influence on dependent variable. A negative sign before t-statistic indicates that during the instrument implementation, debt capital inflows were reduced, i.e. they were smaller as in the case of the absence of listed instruments. Next, portfolio capital restriction appeared to be less important. Moreover, it was established that the variable import of investment equipment had a significant influence on net capital inflows from which it can be derived that

Slovenian enterprises were financing their investments mostly with foreign loans (the latter was stated also by Simonetti, Jamnik, 2000 in their research).

Econometric analysis of net capital inflows influence on tolar exchange rate dynamics. Further on, it was observed that net capital inflows had some significant influence on tolar exchange rate dynamics. Namely, surges in capital inflows represent significant appreciation pressure for Slovenian national currency. In contrast to some other transition countries, Slovenia was confronted with a constant nominal appreciation due to surges in capital inflows (as in Hungary, the Czech Republic, etc). Tolar was constantly nominally depreciated, but not in real terms. In real terms, tolar appreciated. The tolar exchange rate model was defined as ($R^2 = 0.63$ and DW-coef.: 1.68):

$$\text{ERSIT}(t) = C(t) + \alpha{*}\text{CAB}(t) + \beta{*}\text{NCI}(t) + \chi{*}\text{TBFC}(t) + \delta{*}\text{FCD}(t) + \varepsilon{*}\text{DCD}(t) + u(t)$$
$$\quad\quad\quad\quad (-1.349)\quad\quad (-2.583)\quad (+1.121)\quad\quad (+6.549)\quad (+1.243)$$

Results have indicated a significant negative relation of tolar exchange rate dynamics with current account dynamics and net capital inflows. Both variables made pressure on tolar real appreciation. On the other hand, depreciation was accelerated with some of the BS instruments as foreign currency treasury bills and "direct instruments" for debt capital restrictions.

The previous model served as a framework for simulation that indicated what the tolar exchange rate dynamics would be in the case of total absence of the BS adjustment policy. The results of this simulation are shown in Figures 4 and 5 and in Table 6.

Figure 4
Tolar Exchange Rate Dynamics and Simulated Dynamics in the Absence of all Bank of Slovenia Measures (in %)
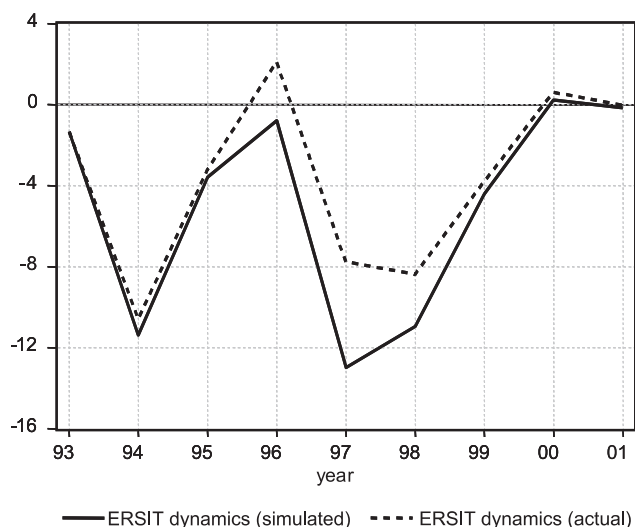

Figure 4 shows tolar exchange rate dynamics assessed with regression between 1993 and 2001 and simulated values of tolar exchange rate in the case of absence of all BS adjustment instruments. Additional appreciation pressure can be noted as a difference between both values.

Figure 5
Additional Exchange Rate Depreciation due to the Bank of Slovenia Adjustment Policy
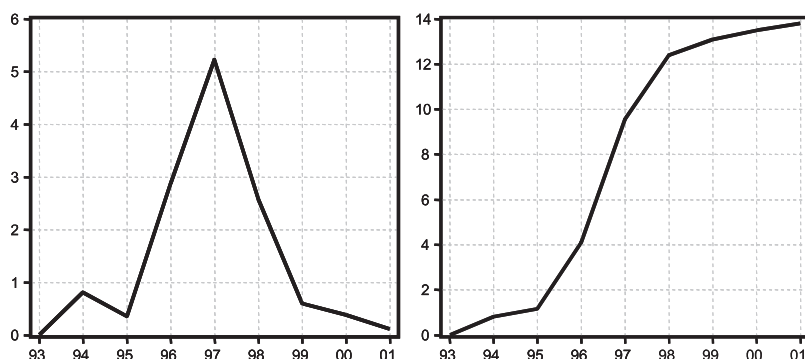(in %)

Figure 5 shows additional depreciation due to the BS adjustment policy, as year-to-year change and as a cumulative change during the analyzed period.

Table 6
Additional Exchange Rate Depreciation due to the Bank of Slovenia Adjustment Policy

	Year-to-year change (in %)	Total change (in %)	Actual tolar exchange rate (SIT/DEM)	Total change (in SIT)	Exchange rate in the absence of the BS measures (SIT/DEM)
1993	0.00	0.00	69.08	0.00	68.84
1994	0.81	0.81	79.60	0.64	78.96
1995	0.36	1.16	82.93	0.96	81.97
1996	2.19	3.35	90.09	3.02	87.08
1997	5.03	8.38	92.27	7.73	84.54
1998	2.55	10.92	94.50	10.33	84.18
1999	1.28	11.53	99.21	11.44	87.78
2000	0.38	12.81	105.15	13.47	91.68
2001	0.12	12.97	109.43	14.19	95.24

With regard to the simulated estimations the tolar exchange rate would have depreciated scientifically less than it had had if the BS had not applied any adjustment policy aimed towards surges in capital inflows. In that case, appreciation of Slovenian national currency would have been 13 % higher than it actually was (assessment done till June 2001). It can be noted that the BS supported nominal depreciation of tolar exchange rate, on average 1.4 % per year. Tolar had the highest support during the 1996 to 1998. Although exchange rate constantly lagged behind inflation, it appreciated by around 4 % per year in the analyzed period, the appreciation being highest in 1994 (3.3 %), 1995 (7.8 %), 1997 (6.3 %) and 1998 (6.4 %)

and the lowest in 1999 (1.6 %) and in the first half of 2001 (1.2 %), as foreign currency supply was additionally reduce by current account deficit.

4. Conclusion

The paper presents an empirically tested assessment of suitability of the BS adjustment policy to capital flows during the last decade. Exchange rate appreciation, banking sector crisis, immoderate money market oscillation, unstable economic trends are just some of the detrimental effects that can be provoked by surges in capital flows if the national economy is faced with some fundamental deficiencies in their economic sectors. Yet the empirical results indicate that the BS successfully mitigated listed effects during the observed period. With the combination of direct and indirect adjustment methods it succeeded in preventing, still vulnerable Slovenian financial sector from a major form of financial crisis. Suggested hypotheses were, that the BS was applying such a combination of "indirect" adjustment measures which helped to prevent extensive detrimental effects of net capital flows on tolar exchange rate dynamics and base money growth rate and succeeded to reduce extensive surges in foreign capital flows by using a suitable combination of "direct" adjustment measures in this period. In order to examine the hypotheses, some empirical tests, like Granger causality test and historical LS regression, were carried out. Acquired results demonstrated that the dynamics of base money as a regulated economic variable really was independent from capital account transactions, but this cannot be asserted for the dynamics of tolar exchange rate. The latter was significantly influenced by net capital inflows, although the BS succeeded significantly to reduce the mentioned influences. It can be said that the BS accelerated nominal depreciation by additional 13 %. In the absence of any BS measures, the value of nominal tolar exchange rate, would be around 95 SIT/DEM instead of the actual 109.43 SIT/DEM as the average value during the first half of 2001 was. Due to presented results we can partly confirm the suggested hypotheses and conclude that the Bank of Slovenia adjustment policy to surges in capital flows during last decade was suitable regarding circumstances in the national economy, although there were some deficiencies.

With regard to the future capital movements and corresponding economic policy assessment it can be argued that the adjustment policy will be in accordance with Slovenia's accession to the EU and further capital market deregulation. Concerning debt capital flows, there are certain limits and Slovenia is not far from them, while future equity capital inflows determinants will be most likely connected with some internal factors (further capital market development, privatization of state-owned companies, interest rate reduction and creation of a friendlier environment for foreign direct and portfolio investment). Finally, the importance of capital outflows should be mentioned. Till now they were almost totally absent, partly due to the former Foreign Exchange Law and partly due to the lack of domestic capital surpluses.

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