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Market pressure on currencies in crises. Shadow exchange rate experience of Argentina and Switzerland 2011-2015

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Abstract

Aim/purpose – The aim of this article is to present two cases of exchange rate controls in Switzerland and Argentina. The paper also examines the problem of presence and evaluation of shadow exchange rate in both countries.

Design/methodology/approach – The shadow exchange rates are estimated using speculative pressure index concept that emphasizes the importance of not only exchange rate movements but also changes in foreign exchange reserves as well as interest rate differentials. The research sample covers Switzerland 2001-2016 and Argentina 2006-2016 (for shadow exchange rate simulation: 2011-2014 and 2011-2015, respectively).

Findings – The conclusions drawn from international experience and conducted empirical analysis are positive. In both cases, shadow exchange rates were close to market rates after the removal of controls. During the restrictions periods shadow rates followed the intuition given by speculative pressure index concept (and by monetary approach, simultaneously).

Research implications/limitations – The research suggests that market forces in both countries were still able to restore exchange rates to market values after the period of control. However, it is obvious that it is very difficult to prove that shadow rates were always determined by economical forces and close to their long-term equilibrium values.

Originality/value/contribution – The original approach combines two important economic concepts – the idea of shadow exchange rate and the methodology of index of speculative pressure. Combined together they can help to analyze two interesting and relatively new cases of foreign exchange controls in Switzerland and Argentina. The

results can be valuable for economists, researchers and politicians who support or reject the idea of controlling macroeconomic parameters in modern, open economy.

Keywords: exchange rates, financial crises, international capital flows.

JEL Classification: F21, F31, F37, F38, G15.

1. Introduction

The success of globalization and liberalization of capital flows was accompanied by almost universally accepted view that exchange rates should be determined by independent market forces. While in 1996 free floating (or managed float) exchange rate arrangements were in force in 30% of IMF member countries, in 2002 this share jumped to about 60%. The structural changes in international financial markets before, during and after the crisis of 2008-2009 have renewed efforts to understand and manage problems with exchange rates fluctuations, speculative pressures and long lasting trends. Two countries have suffered so significant market pressure on their currencies that their authorities decided to introduce exchange rate arrangements of extensive controls in 2011. In September 2011, due to massive inflow of international funds and substantial exchange rate appreciation, Swiss Central Bank established the peg to the euro. Two months later, in the face of depleting of foreign reserves and speculative pressure on peso, Central bank of Argentina decided to introduce the system of currency controls.

The aim of this article is to verify the hypothesis about the exchange rate determination in periods of extensive controls (capital account restrictions, exchange rate controls) using the concept of shadow exchange rate [Flood & Marion 1998]. We assume that even during the controls period market pressure on currency still exists, although is not clearly visible in the exchange rate quotations. To estimate this pressure we employ the idea of speculative pressure index [Eichengreen, Rose & Wyplosz 1994]. Finally we estimate shadow exchange rates [Flood & Garber 1984; Flood & Marion 1998] for EUR/CHF and USD/ARS currency pairs during periods of control.

In the first part of the article we present stylized facts to show reasons and economic environment leading to the decision of replacing free float exchange arrangements with systems of extensive controls. In the second part we introduce the concept of a shadow exchange rate – the rate that “follows” the official, controlled exchange rate. To estimate shadow exchange rates we use values of speculative pressure index during the periods of controls but with parameters from preceding periods. Finally, shadow exchange rates are compared to values of official exchange rates and free market rates after the lifting controls on these currencies.

2. Stylized facts

In the second decade of the XXI century we were able to observe two interesting experiments with the control of exchange rates. In September 2011, due to massive inflow of international funds and substantial exchange rate appreciation, Swiss Central Bank established the peg to the euro. Two months later, in the face of depleting of foreign reserves and speculative pressure on peso, Central Bank of Argentina decided to introduce extensive system of currency controls.

2.1. Switzerland

The Swiss foreign exchange market drew the attention of the authors in December 2007 when the *Triennial central bank survey of foreign exchange and derivatives market activity in April 2007* [BIS 2007] was published. After many years of declining significance of CHF, unexpectedly, in April 2007, the turnover of CHF reached 6.1% of the total world FX turnover. Value of daily turnover jumped from 79 bn USD in 2004 to 242 bn USD in 2007. Analyzing the situation on FX markets – and the sudden trend reversal in March 2007 – one can say that the Swiss currency market became one of the key markets of incoming global financial turmoil.

The period until August 2008 did not show visible effects of changing sentiment on international financial markets towards CHF and the situation in monetary policy area seemed to be under the control of Swiss National Bank. But from September, when it became clear that current disruptions were not only a minor adjustment, but a significant shock to the global economy (with a slow-down perspective), international funds, started to flow into the Swiss financial market. In less than a year Switzerland's currency reserves have doubled. However, it seemed that the interest rate cut, at the turn of 2008 and 2009, by 2.5 percentage points (from 2.75% to 0.25%) effectively stopped the inflow. It may be assumed that classical monetary policy tools would be sufficient to stabilize the situation, but the measures taken by foreign central banks (interest rates cuts) have caused a new wave of capital inflow, resulting in an increase of SNB reserves to unprecedented 295 bn of CHF (or 275 bn USD)¹.

Another threat to the stability of SBN monetary policy was the escalation of the Greek crisis and the global debt crisis in 2011. In the first half of the year the

¹ At the same time, the global financial crisis has spread on the Swiss financial sector. The two largest Swiss banks asked for public (about 60 bn USD for UBS) and private (10 bn USD for Credit Suisse) financial support.

ratings of the whole group of European countries were downgraded. On August 5, Standard & Poor's changed the rating of the United States from AAA to AA+ (with a negative outlook), fueling speculations about possible US bankruptcy. On August 3, 2011, SBN decided to lower its 3M LIBOR CHF target to 0%-0.25% (from 0%-0.75%) and increased its liquidity supply from 30 bn CHF to 80 bn CHF. Continuing its monetary expansion SNB increased this amount to 100 bn CHF, and finally, on August 10, to 200 bn CHF. This move allowed to reverse the CHF appreciation trend for two weeks, when the CHF started to strengthen again.

From January 2007 to August 2011 the Swiss franc suffered more than 45% nominal appreciation and almost 35% real appreciation. On September 6, 2011, Swiss National Bank decided to set minimum exchange rate at CHF 1.20 per EUR. This decision was justified by "current massive overvaluation of the Swiss franc" that posed "an acute threat to the Swiss economy" and carried "the risk of a deflationary development" [Zurbrügg 2012]. This move was accompanied by another two waves of capital inflow. In 2011 foreign exchange reserves accumulated to around 300 bn CHF and jumped in 2012 to 500 bn CHF. At this level reserves remained till the end of 2014.

In the third quarter of 2014 the conflict in Ukraine fueled massive inflow of funds to Switzerland again. In response to currency appreciation and foreign exchange accumulation, on 18 December 2014, the SNB introduced a negative (-0.25%) interest rate on deposit account balances in excess of 10 m CHF, widening the 3M LIBOR target range from -0.75% to 0.25% [www 6]. At the beginning of 2015, the SBN authorities decided that the transitional control of the Swiss franc was no longer necessary and abolished the peg to the euro at 1.20. Market response surprised SNB authorities, EUR/CHF immediately depreciated to EUR/CHF 0.85, finally stabilizing at EUR/CHF 1.05.

2.2. Argentina

Between 2001 and 2002, Argentina experienced the biggest financial crisis in the country's history which ended with external insolvency.

In May 2003, the presidency of Néstor Kirchner started the new era in the Argentinian history. In 2005 he successfully started the process of renegotiations of 82 bn USD state debt in sovereign bonds that defaulted in 2001. In 2006, 9.8 bn USD of debt was repaid to International Monetary Fund. Simultaneously, Kirchner, enjoying national popularity and support, abolished restrictions on trade unions, increased wages, pensions and social benefits, and expanded social wel-

fare programs. He also introduced restrictions on land acquisition by foreigners and subsidies to maintain low prices for transport and media.

Soon, the authorities had to answer three questions. How to finance fiscal expansion? How to maintain the level of foreign exchange reserves? How to create a surplus on the current account? It is important to understand that Argentina was cut off from external financing after the bankruptcy in 2001.

The first solution was the introduction of export taxes on cereals, beef and soybeans. This, however, was the cause of the political crisis and social protests in 2008. The second idea was to obtain a loan from the Central Bank of Argentina. This, however, demanded the removal of President of CBA, Martin Redrado, from his post. Since 2004 he has rebuilt currency reserves and improved the economy's competitiveness. In 2010, the Central Bank Act was amended to define a new monetary policy objective: “[...] to promote – within the framework of its powers and the policies set by the National Government – monetary and financial stability, employment, and economic development with social equality” (Charter of the Central Bank of the Argentine Republic [www 3]). The Bank could also “[...] make temporary advances to the National Government in an amount equivalent to up to twelve per cent (12%) of the monetary base [...]. It may also grant advances in an amount not exceeding ten per cent (10%) of the cash flows earned by the National Government in the last twelve (12) months” [www 3]. In 2012 the government was allowed to use foreign exchange reserves kept by Central Bank of Argentina.

Other popular solutions were the introduction of price control for food, transportation, media and about 300 products, the nationalization of REPSOL petroleum company in 2012, state control of oil extraction and sales at differentiated domestic and foreign prices. One can add that in November 2008 ten private pension funds worth about 24 bn USD were nationalized. However, fiscal and monetary expansion created substantial inflationary pressure.

Significant changes have been also implemented in the trade policy. Export subsidies, export loans with negative real interest rates and import licenses for 600 product lines were introduced. Informal recommendations for entrepreneurs to offset export spending and incentives to relocate production to Argentina were issued.

Important changes occurred in the area of capital controls. In November 2011 Argentinian authorities decided to introduce a system of currency controls (later named “dollar clamp”). To reduce the demand for currency, banks and exchange offices had to verify the source of origin of individuals' funds before the conversion into dollars. Investors buying shares and real estate have been obliged to deposit funds on the account in Argentina. People who bought more

than 250 000 USD a year had to document the source of origin of their funds. Mining companies were required to deposit receipts from exports domestically. In turn, insurance funds were supposed to sell foreign assets and transfer proceeds to Argentina. In 2012 it was officially banned to purchase dollars by residents (either Argentinian or foreign) as a form of financial savings (although existing dollar saving accounts and time deposits were allowed). Despite extensive system of capital account controls in mid-January 2014, the Central Bank of Argentina had to reduce the scale of market interventions, which resulted in sharp peso depreciation by over 12%. This step was later followed by the lowering of credit ratings to selective default by Standard & Poor's and to restricted default by Fitch.

By the end of the term, President Cristina Kirchner's direction of economic and exchange rate policies has not changed. The lack of positive economic results, high inflation, corruption scandals and massive social protests have contributed to the change on the president post in December 2015. New Finance Minister, Prat-Gay, appointed by a new President Mauricio Macri, decided to float Argentinian peso on December 17, 2015. As expected, after the decision a sharp depreciation from USD/ARS 9.8 to USD/ARS 13.8 occurred. At the end of December and in January 2016 the peso rate began to stabilize.

3. Research methodology

In this chapter, the authors would like to introduce a concept of shadow exchange rate. The shadow exchange rate is widely used in the economic literature in the context of international trade [Balassa 1974; Tsakok 1990] and finance [Piersanti 2012]. In the latter case, the shadow exchange rate helps either to estimate the actual purchasing power or to determine the exchange rate that would prevail on the market in the absence of capital account or official exchange rate controls.

Flood & Garber [1984] define shadow floating exchange rate as the floating exchange rate conditional on a collapse of the fixed-rate regime. This rate would prevail if the traders purchased all remaining foreign reserves used to defend the peg, and the central bank refrained from foreign market interventions thereafter. In Krugman [1979] model the shadow rate balances the money market after all foreign reserves have been depleted. The shadow exchange rate can be analyzed when the official exchange rate is under control (fixed, pegged, etc.) or when the rate is determined generally by market forces but there are significant capital constraints hindering transactions on the market. Flood & Marion [1998] define

the shadow exchange rate as a rate that balances the money market following an attack in which foreign exchange reserves are exhausted. During the period of control the rate (*ser*) can be defined as:

$$\text{ser} = \alpha\mu + d$$

where:

d – domestic credit,

μ – rate of growth of domestic credit (equal to the drop rate of foreign exchange reserves).

The shadow exchange rate may be, though not necessarily, close to the black market rate, if this market exists.

In this article the authors decided to combine the concept of a shadow exchange rate with the idea of an index of speculative pressure. We would like to verify the hypothesis if it is possible to evaluate the shadow exchange rate during the period of control using the concept of speculative pressure. During the period of control (capital account control, exchange rate control) there are still internal or external forces in the FX and money markets that can substantially affect the shadow exchange rate through commercial (international trade) channels or officially allowed capital transactions. They can create parallel perception of “correct” exchange rate (in contrast to official exchange rate). It means that shadow exchange rate is still taken into market players’ accounts and actions.

In the next part of the study we would like to analyze the behavior of the EUR/CHF and USD/ARS shadow exchange rates during the period of control. These rates will be obtained by decomposing the speculative pressures estimated by the speculative pressures index (proposed by Eichengreen, Rose & Wyplosz [1994]) for the control period, however, using the long-term parameters obtained from the preceding, free market period.

Eichengreen, Rose & Wyplosz [1994] developed an index of speculative pressure, pointing out that the pressure on a currency can not only result in a sharp depreciation, but can be also accompanied by a drop of foreign exchange reserves and by an increase of interest rate differential. They suggest that to observe exchange rate fluctuations is not enough. Domestic monetary authorities can defend the parity using foreign reserves as well as raise interest rates – with a potentially devastating effect to domestic economic growth and country’s international liquidity. Their intuition starts with a slightly modified monetary approach (replacing base money with the sum of domestic credit *D* and international reserves *R*) to exchange rate determination:

$$e + (i - i^*) - (r - r^*) = (d - d^*) - \beta (y - y^*) + (1 + \alpha) (i - i^*)$$

where:

i – interest rates,

r – foreign exchange reserves,

d – domestic credit,

y – level of GDP,

asterisks (*) denote the foreign country, and β (α) is the income (interest-rate) semi elasticity for money demand.

The left-hand side of this equation is an index of speculative pressure, which says that pressure increases as domestic reserves of foreign exchange decline, as interest rates rise, and as the exchange rate depreciates. The empirical formula for their index is (with empirical parameter estimates) as follows:

$$\text{Index of speculative pressure} = \% \Delta e + 7 [\% \Delta (i - i^*)] - 0.08 [\% \Delta (r - r^*)]$$

where:

$\% \Delta e$ – nominal exchange rate change (in %),

$\% \Delta (i - i^*)$ – interest rate differential change (in %),

$\% \Delta (r - r^*)$ – relative foreign exchange reserves change (in %).

Eichengreen, Rose & Wyplosz [1994] used their index to identify periods of significant (over 2.5 of standard deviation) speculative pressure during attacks on pegged exchange rates in 22 countries between 1967 and 1992 (with a particular interest on 7 countries-members of ERM)².

The study presented in this paper was carried out in four stages.

- **Stage one.** The evaluation of speculative pressure indexes for “no restrictions” period and for exchange rate control/capital account restrictions period.
- **Stage two.** The decomposition of the second index (with respect to exchange rate) using the parameters from the first (“no restrictions”) one.
- **Stage three.** Estimation of shadow exchange rates (the rates that would probably prevail in the market in the absence of control measures but in the presence of the same speculative/market pressure).
- **Stage four.** The comparison of (last) shadow exchange rates to (first) official, free market rates.

² For interesting literature review on Speculative Pressure Index (SPI), Index of Currency Market Turbulence (ICMT), Banking Sector Fragility Index (BSFI) and Excessive Risk Index (ERI) see: Ege & Bayrakdaroglu [2010].

4. Empirical analysis

All data were obtained from websites of the Swiss National Bank [www 5] and the International Monetary Fund [www 4] as well as from International Financial Statistics database [IMF IFS 2017]. We used monthly data, for Switzerland: nominal rate EUR/CHF [www 5], total reserves minus gold, CHF LIBOR3M, EURIBOR3M (all available at [www 5]); for Argentina: nominal rate USD/ARS (213...AF.ZF...), total reserves minus gold (213.1L.DZF...), money market rate (21360B...ZF...), Euro dollar London (11260D...ZF...) (all available at [IMF IFS 2017]).

The speculative pressure index formulas for periods before and during controls are as follows:

Switzerland, May 2001 – August 2011

$$\text{SPI (no restrictions)} = (0.0125) \Delta e_t + (0.1108) [\Delta(i - i^*)_t] - (0.0746) [\Delta(r)_t]$$

Switzerland, September 2011 – December 2014

$$\text{SPI (controls period)} = (0.0131) \Delta e_t + (0.1981) [\Delta(i - i^*)_t] - (0.0494) [\Delta(r)_t]$$

Argentina, June 2006 – October 2011

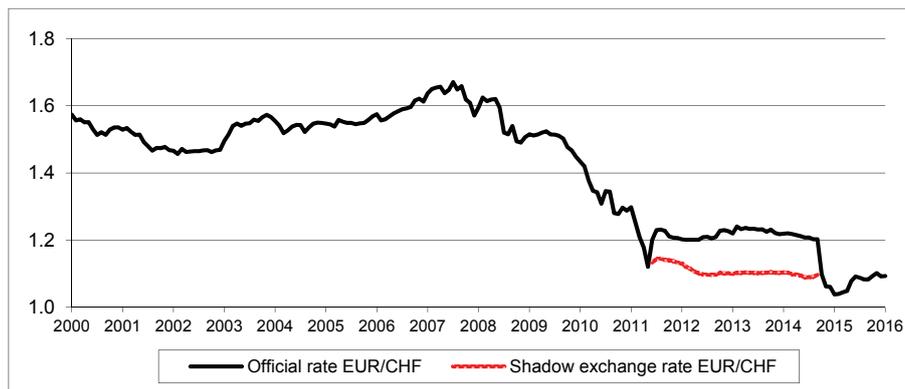
$$\text{SPI (no restrictions)} = (0.1841) \Delta e_t + (0.009968) [\Delta(i - i^*)_t] - (0.07623) [\Delta(r)_t]$$

Argentina, November 2011 – November 2015

$$\text{SPI (controls period)} = (0.2552) \Delta e_t + (0.0311) [\Delta(i - i^*)_t] - (0.1254) [\Delta(r)_t]$$

Figures 1 and 2 present both nominal rate and shadow exchange rate for EUR/CHF and USD/ARS. As can be seen in Figure 1, the uncontrolled EUR/CHF rate would most likely be subject to further, small but constant appreciation. In January 2015 the shadow rate was at a similar level (EUR/CHF 1.10) as the nominal exchange rate after lifting the cap January 16, 2015 (EUR/CHF 1.01). This suggests that the scale of appreciation after the floating should not surprise market players.

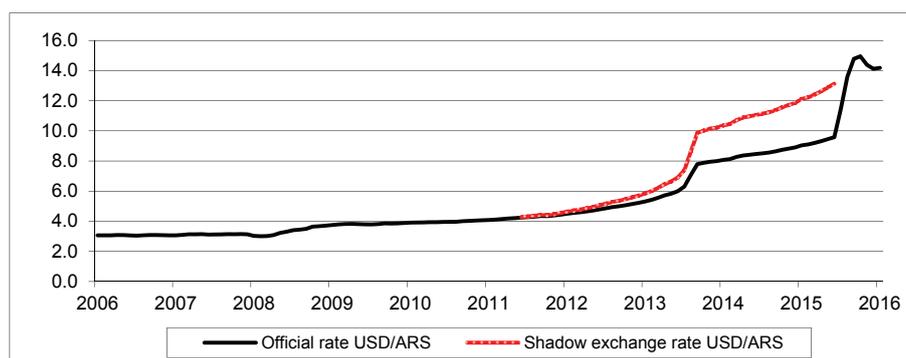
Figure 1. Official rate and shadow exchange rate EUR/CHF (2000-2016)



Source: [www 5], own estimates.

Figure 2 depicts official and shadow exchange rate USD/ARS. After the introduction of system of extensive exchange rate controls (“the clamp”) we can observe increasing difference between official and shadow rate³. At the end of control period (October 2015) the shadow rate estimated in our research (USD/ARS 13.12) was close to the first quotation (December 17, 2015) in a free currency market of USD/ARS 13.30.

Figure 2. Official rate and shadow exchange rate USD/ARS (2006-2016)



Source: IMF IFS [2017], own estimates.

5. Conclusions

Swiss franc and Argentinian peso are the newest examples of currencies in crises. Both lessons are very interesting either for countries that decided to stay outside monetary unions with independent currencies or for countries that decided to change their direction of economic growth from market- to state-oriented economy. In the first part of this article the most important facts leading both countries to control exchange rates and to float them ultimately were described. In the next part concepts of shadow exchange rate and index of speculative pressure were presented. In the empirical part shadow exchange rates for EUR/CHF and USD/ARS were evaluated. One can see that values of shadow exchange rates differed from official rates substantially. However, the free market rates after liberalization were very close to last values of shadow rates in controls periods. The results of this research bring us to two important conclusions. The first one suggests that in both cases internal market forces still drove both economies and even after such a long period of controls, exchange rates still had the

³ Compare results of this survey to the black market rate (market for “blue dollar”). See: [www 1; www 2].

ability to return to the market equilibrium. It is an important lesson for practitioners, politicians, as well as scientists. The second conclusion is that shadow exchange rate theory still can be helpful in exchange rate evaluation during periods of capital account restrictions, exchange rate controls, etc. Moreover, the implementation of index of speculative pressure into our analysis supports the classical view on currency market in general [Frankel 1993] and exchange rate determination models in particular [Dornbusch 1976].

Besides, the authors understand the limitations of this research and probably its results could not be taken universally. The first, methodological limitation is the assumption that market pressure distributes in the same manner in the period of controls as before. This is rather short-term assumption, especially if capital account restrictions are accompanied by political and non-market oriented reforms. The second one is the length of the controls period. It can be easily proven that sufficiently long period of controls can effectively damage internal market forces as it happened decades earlier in communist countries. The difference between the shadow exchange rate and market rate after the liberalization can be significant enough and the correction of this gap can take much more time.

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