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**Managing Capital Flows in Poland.
Experiences, Problems and Questions**

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1. INTRODUCTION

Massive capital flows have become a hallmark of the international economy and one of the most conspicuous symptoms of globalisation in the last decade of the XXth century. Supported by financial liberalisation and deregulation, increased openness of individual economies, and rapid technological progress in communication, capital flows have moved between developed countries and from developed to developing countries, including the emerging economies of central and east Europe, in search of attractive investments and high rates of return. Poland is not an exception to this tendency. Capital inflows to the Polish economy have increased rapidly during last years, contributing to the country's development potential through new investments and technology transfers, but at the same time strongly affecting monetary and external balance and complicating macroeconomic policy.

The purpose of the paper is to make an overview of capital inflows to Poland, to examine its impact on monetary and exchange rate policy and to suggest policy recommendations. The next section summarises basic facts and figures concerning capital inflows and discusses the main factors behind the rapid increase of inflows after 1994. The following section investigates the implications of capital inflows for monetary and exchange rate policies under different monetary and exchange rate policy rules. In Section 4, a simple analytical framework is used to examine the consistency of an "eclectic" monetary policy rule under capital mobility. It is demonstrated that the "eclectic" rule is largely ineffective in fighting inflation under large capital inflows and may even lead to perverse results. The last section discusses problems and policy options on the road to EU and EMU membership. It is argued that the requirement to meet the set of the so-called "Maastricht criteria" poses serious challenges before the Polish economy, and that appropriate policies should aim at maintaining maximum flexibility as long as possible before the country can join the EMU.

2. CAPITAL INFLOWS TO POLAND: AN OVERVIEW

2.1. Facts and Figures

The history of capital inflows to Poland after the transition started in 1989 covers two distinctively different periods. Between 1990 and 1994, capital inflows remained very modest and their impact on monetary and real sectors of the economy insignificant. Since 1995 capital inflows have sharply increased, strongly adding to domestic investment and contributing to country's economic development but at the same time seriously complicating the monetary and exchange rate policies.

When the ambitious market reform program was initiated in 1989-1990, Poland did not have regular access to international financial markets. The country, heavily indebted after the failed attempt in the 1970s to modernise the economy and speed up economic growth through heavy reliance on massive foreign credits, fell into a debt trap and unilaterally suspended servicing its debt owed to official creditors (the Paris Club creditors) as early as in 1980. The default and the lack of a formal agreement on debt restructuring with the Paris Club countries severely restricted Poland's possibilities to resort to international financial markets to

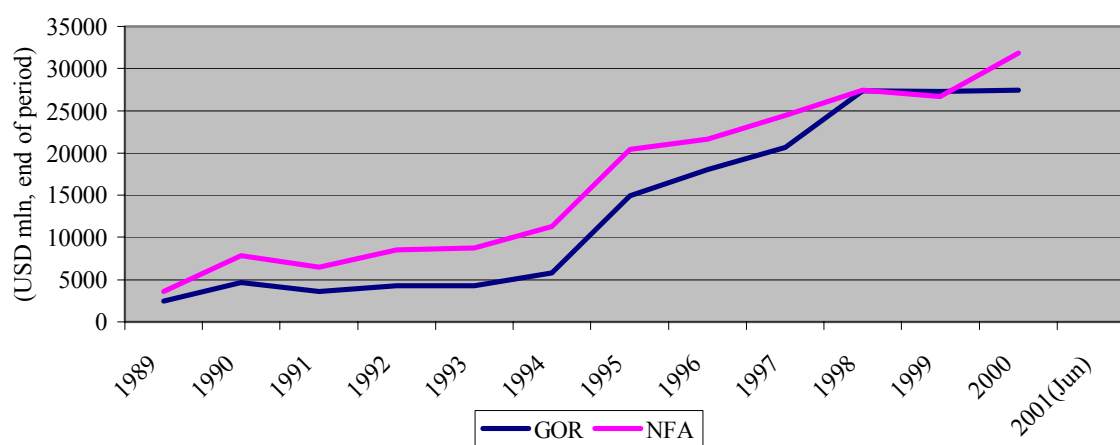
overcome the economic crisis in the late 1980s and in the initial years of transition. The only external resources available to Poland at that time was the IMF stand-by support program, limited concessionary assistance from the ECE countries and the Stabilisation Fund to support the Polish currency¹. By contrast, the policy with respect to private creditors (the London Club) was deliberately different. Poland continued to pay all due interest charges while rolling over the principal amount of debt. This consistent policy of honouring its obligations to international commercial banks paid off as Poland was able at least to finance its current foreign trade transactions.

The successful launching in 1989-1990 of the program of market and democratic reforms helped to change the attitude of foreign investors towards Poland. Prices and foreign trade were radically liberalised, the national currency was stabilised and made convertible for most of current account transactions, and business activities deregulated. Combined with democratic reforms, these systemic and policy changes opened way for foreign capital to gradually return to Poland.

One measure of the magnitude of capital inflows are the changes in gross official international reserves (GOR) of the National Bank of Poland (NBP) and in net foreign assets of the banking sector (NFA). As Figure 1 shows, capital inflows initially remained limited. Under the fixed exchange rate regime in 1990-1991, and the rigid crawling peg regime that followed during 1991-1994, the NBP intervened routinely in the foreign exchange market, buying and selling foreign currency at predetermined rates and sterilizing the monetary impact of the changes in international reserves. Before 1995 those operations involved rather limited amounts of foreign exchange, as outward capital mobility remained restricted while capital inflows were relatively insignificant. Under the regime of sterilised interventions capital inflows were almost entirely converted into increasing international reserves of the central bank.

¹ The Stabilisation Fund of USD 1 bn was established at the initiative of the United States by the OECD member countries at the end of 1989. It was supposed to back the fixed rate of the Polish zloty in the initial stage of stabilisation program. Not a single dollar was ever used for that purpose because the stabilisation operation proved surprisingly successful. In 1995-96 the resources of the Fund were used to support the reform of the banking sector in Poland.

Figure 1

Gross international reserves and net foreign assets in Poland, 1989-2001

As shown in Table 1, gross official reserves almost doubled in the first year of transition, but only from the extremely low level in 1989. In the following four years between the end of 1990 and the end of 1994 international reserves increased only by 25% from USD 4.7 bn to 5.8 bn. Only after 1994 did capital inflows accelerate strongly: between 1994 and 1998 the level of reserves jumped up from USD 5.8 bn to 27.4 bn, i.e. almost five times in four years. The increase in NFA in that period was less pronounced but also very substantial (2.4 times). After 1998 the level of GOR stabilised in result of the change in the monetary and foreign exchange regime.

Table 1

International reserves in Poland, 1989-2000 (USD mln, end of period)

Year	Gross Official Reserves	Net Foreign Assets
	a)	b)
1989	2503	3628
1990	4680	7822
1991	3614	6505
1992	4287	8552
1993	4281	8755
1994	5839	11289
1995	14963	20436
1996	18033	21667
1997	20670	24443
1998	27382	27484
1999	27314	26690
2000	27464	31863

a) of the National Bank of Poland

b) of the consolidated banking system

Source: National Bank of Poland

The composition of capital inflows after 1994 is shown in Figure 2 and Table 2. As can be seen, the importance of individual inflow categories changed over time. Annual net inflows of FDI were growing steadily, from USD 1.1 bn in 1995 to 9.3 bn in 2000. Portfolio inflows fluctuated much more widely but remained positive in every year. The most volatile component was “other capital inflows” (including foreign credits and changes in bank accounts) that reached the peak of USD 6.3 bn in 1998, but then fell sharply to a net outflow of USD 4.2 bn in 2000. On balance, the net cumulative inflows of FDI between end-1994 and end-2000 were USD 27.4 bn and largely exceeded the cumulative portfolio inflows and other capital inflows (9.1 bn and 9.6 bn, respectively). The total amount of net capital inflows to Poland in that period reached almost USD 46 bn, with FDI accounting roughly for 60% of the total.

Figure 2

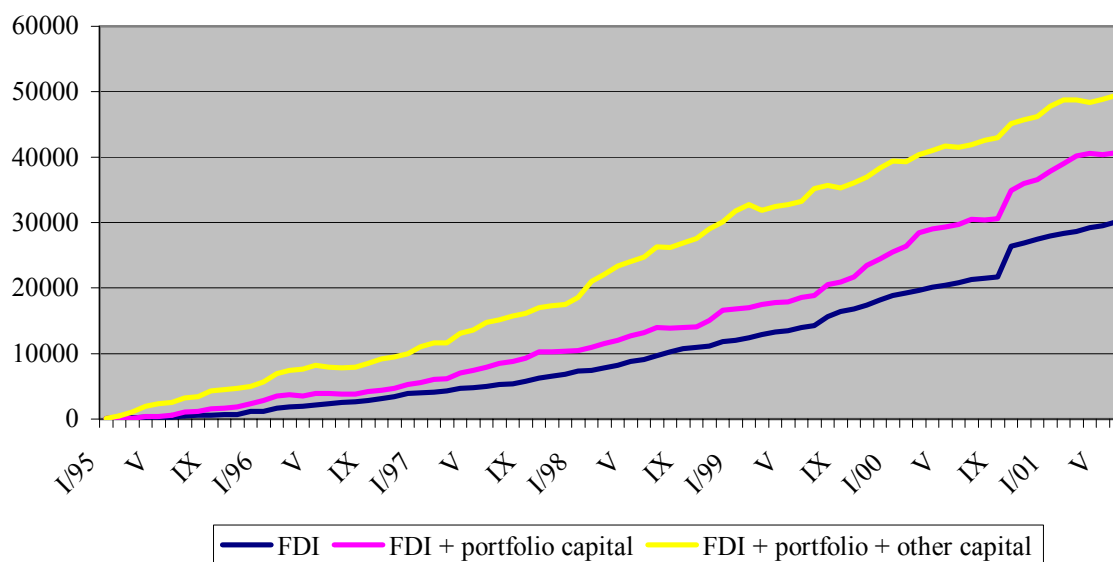
Cumulative capital inflows to Poland, by main categories, mln USD, Jan 1995-Jun 2001

Table 2

Capital inflows to Poland, by main category, 1995-2000 (mln USD and as % of GDP)

Year	Capital inflows in mln USD			Capital inflows as % of GDP		
	FDI	Portfolio	Other	FDI	Portfolio	Other
1995	1134	1171	2675	0.89	0.92	2.10
1996	2741	241	2040	1.91	0.17	1.42
1997	2941	2098	2471	2.06	1.52	1.42
1998	4966	1331	6259	3.13	0.84	3.95
1999	6348	1449	409	4.09	0.93	0.26
2000	9299	2850	-4244	5.85	1.83	-2.67

Source: National Bank of Poland, own calculations.

Table 2 also shows the capital inflows as proportion of GDP. Again the share of FDI has been increasing steadily from less than 1% in 1995 to almost 6% of GDP in 2000. The other components of capital inflows were significantly less important (except “other capital inflows” in 1998 that amounted to almost 4% of GDP). The ratio of total inflows to GDP increased sharply from around 3.5% in 1996 to 8% in 1998, but then fell to 5%. The high proportion of FDI makes capital inflows to Poland less volatile than in other countries, provides solid financing for current account deficit, and significantly reduces the risk of a sudden withdrawal of capital. Moreover, it also considerably increases Poland’s growth potential².

2.2. Institutional Factors Behind Capital Inflows to Poland: Debt Restructuring, Market Reforms and EU and OECD Accession

The sharp acceleration of capital inflows after 1994 was caused by a number of factors that can be generally be classified into two categories: institutional measures and macroeconomic developments. Probably the most important one was the debt reduction agreement with official and private creditors. After long and protracted negotiations Poland signed in September 1994 the debt-restructuring agreement with the Paris Club creditors, and in December 1994 with commercial banks. Both agreements provided for a 50% reduction of foreign debt and for substantial restructuring of the remaining debt, including extension of the bulk of repayments beyond 2004 and until 2024. With respect to private creditors, part of the remaining debt was converted into marketable Brady-type bonds. The agreements allowed Poland to restore regular business relations with international financial community. The country was given an investment grade from international rating agencies and returned – after fifteen years - to international financial markets. Reduced investment risk combined with strengthened economic and political stability and rapid growth has made the Polish economy an increasingly attractive market for international investors. At the same time, many restrictions on capital mobility were removed and foreign investors have been invited to participate in the privatisation programmes.

The second reason for accelerated capital inflows were wide-ranging institutional and policy changes that took place in that period. First, in 1992 Poland signed the Association Agreement (later renamed as Europe Agreement) with the EU. The Agreement established within few years a free trade area for manufactures between Poland and the EU and opened way for joining the EU in future. The largely unrestricted access to EU markets provided yet another strong motive for foreign investors to expand to Poland. Second, the gradual implementation of the provisions of the Europe Agreement in the field of harmonisation of laws, as well as norms and standards, helped to substantially reduce transaction costs for foreign trade and investments. In 1995, Poland assumed obligations of IMF Article VIII provisions for currency convertibility for current transactions, which considerably reduced the currency risk and increased transparency in foreign exchange transactions.

² The share of FDI in total gross fixed capital formation in Poland exceeded 15% for the period 1996-1999. In other emerging economies, the ratio varied from 3% in India and Russia to 9-12% in Argentina, Brazil, China and the Czech Republic, to 15-16% in Chile and Hungary and more than 20% in Venezuela and Kazakhstan (UNCTAD, 2000, pp.306-317).

Poland's accession to OECD in 1996 also worked in the same direction. One of the key policy reforms made at that time was the adoption of the new foreign exchange law that removed most of the remaining restrictions on capital account transactions. The progress of market reforms, continued economic growth and rapid advances on the road towards full integration with the EU have all helped Poland in improving its image and reputation among investors. This progress has been reflected in systematic upgrading of international investment rating for foreign currency denominated debt. Starting with Standard & Poor's grade of BB back in 1995, the country moved up by four notches in five years, reaching BBB+ in 2000. Table 3 shows the evolution of the long-term foreign currency sovereign rating for Poland by Standard & Poor's and Moody's.

Table 3
Changes in the long-term foreign currency sovereign rating of Poland by two international agencies

Year	Standard & Poor's	Moody' Investors Service
1995	BB	Baa3
	Positive outlook	
1996	BBB-	
	Stable outlook	
1997	BBB	
	Positive outlook	
1988		Baa3
	Positive outlook	
1999	BBB	Baa1
	Positive outlook	Positive outlook
2000	BBB+	
	Positive outlook	
2001	BBB+	
	Stable outlook	

Source: Ministry of Finance.

An important component of market reforms and integration policies was gradual liberalisation of capital transactions. It started already in 1989 with the elimination of restrictions on inward FDI and profit transfers abroad. A further step was made in 1994 with the adoption of a new Foreign Exchange Act that opened way for removing many other restrictions on capital transactions and allowed Poland to assume obligations of Article VIII of IMF Articles of Agreement on current convertibility in June 1995. In a series of Ordinances issued by the Ministry of Finance, all kinds of capital movements directly related to international trade transactions, such as commercial credits and all capital flows related to FDI, were made free.

This progress notwithstanding, cross-border capital mobility still remained more restricted than in OECD countries. Upon accession to OECD in 1996, Poland was granted several derogations to the Code of Liberalisation of Capital Movements and Code of Liberalisation of Invisible Transactions, but under the condition that these exceptions will be phased out by the end of 1999. The exceptions included chiefly short term credits and loans, money market operations, opening deposit accounts by residents abroad and non-residents at home. However, due to a series of financial crises that hit the world economy in 1997-1998 (South-East Asia, Russia), the pace of further liberalisation was slowed down. A new Foreign Exchange Law that was prepared and promulgated in January 1999 still retains some restrictions on short-term capital flows. The chronology of liberalisation of capital movements in Poland is presented in Annex A.

The currently existing restrictions on capital movements refer principally to short-term capital flows and cover the following types of capital transactions (as of 30 September 2001). These transactions require permission from the NBP.

1. Purchases by residents of foreign short-term securities with maturity less than one year and derivative instruments (except for authorised banks that are subject to specific precautionary norms);
2. Issuing and sale by residents on foreign markets of short-term securities and derivatives with maturity less than one year;
3. Purchases by non-residents of short-term securities and derivatives with maturity of less than one year on the domestic market, except for purchases of treasury bills and bonds and other securities offered by domestic banks;
4. Issuing and sale by non-residents of short-term securities and derivatives with maturity of less than one year on the domestic market;
5. Granting and receiving short-term credits and loans with maturity of less than one year between residents and non-residents, except for supplier credits and credits of less than EUR 50,000.
6. Placements of deposits denominated in PLN by non-residents in domestic banks for less than 3 months and more than PLN 500,000.
7. Opening accounts by residents abroad (except for travelling and temporary journeys)

The key rationale behind maintaining the selective restrictions is to limit the scope for short-term capital movements and thus reduce the risk of a sudden withdrawal of capital in case of a speculative attack. But the practical importance of these restrictions becomes limited as investors are able to use various derivative instruments to circumvent the existing restrictions³.

³ E.g. the restriction on short-term credits can be effectively neutralised by making swap transactions on future purchase (sale) of foreign (domestic) currency.

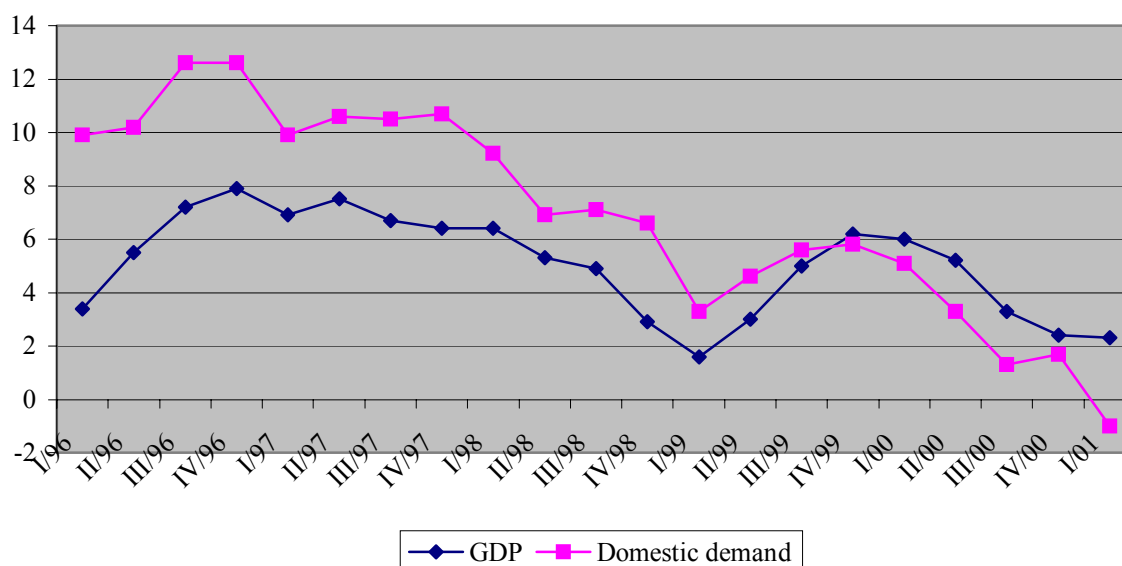
2.3. Macroeconomic Factors Behind Capital Inflows to Poland: Rapid Economic Growth and Restrictive Monetary Policy

Foreign capital has been also attracted to Poland by robust economic growth and rapidly increasing domestic demand. The “transformational” recession in Poland was milder and ended earlier than in other transition countries. The economic recovery started already in 1992, and the average annual GDP growth rate between 1993 and 2000 was 5.5%. Rapidly growing incomes of population have made the Polish internal market of some 40 million consumers increasingly attractive for foreign investors and banks. Increased access to foreign financing combined with accelerated expansion of consumer and investment expenditures. After 1995 domestic demand was growing much faster than GDP and as a result current account deteriorated substantially. Figure 3 shows that the gap between the domestic demand and domestic output in 1996-1998 was in the range of 3-4 of GDP each year, and that it was eliminated only in the last quarter of 1999. The gap was reflected in the growing current account deficit that exceeded 8% of GDP in the first half of 2000 before coming down to some 5.5% in the first half of 2001 (see Figure 4).

Large current account deficit was partly a cause and partly an effect of large capital inflows. On the one hand, higher imports were easily financed by credits from foreign banks – indebtedness of domestic companies increased from USD 16 bn in end-1997 to 26 bn in end-2000 – and by foreign purchases of Treasury bonds and bills that enabled the government to finance the budget deficit. On the other hand, large FDI inflows were mirrored in the trade balance by massive imports of technologies and production components.

Figure 3

Changes in output and demand in Poland, 1996-2001, (in % per annum)



One factor that is frequently mentioned in the context of capital inflows analysis is the role of monetary policy. Persistently high inflation inherited from last years of central planning

forced the central bank to systematically maintain high real interest rates in Poland. This resulted in high yields on securities denominated in Polish currency, well above the yields on comparable securities in other countries, even after accounting for the expected depreciation of the zloty. Simple economic logic would suggest that the large interest rate disparity should attract substantial amounts of capital to Poland, especially in the form of investments in fixed-income instruments, such as Treasury bills, Treasury bonds, as well as bank credits extended to enterprises.

Figure 4

Current account balance in Poland, as % of GDP, 1994-2001

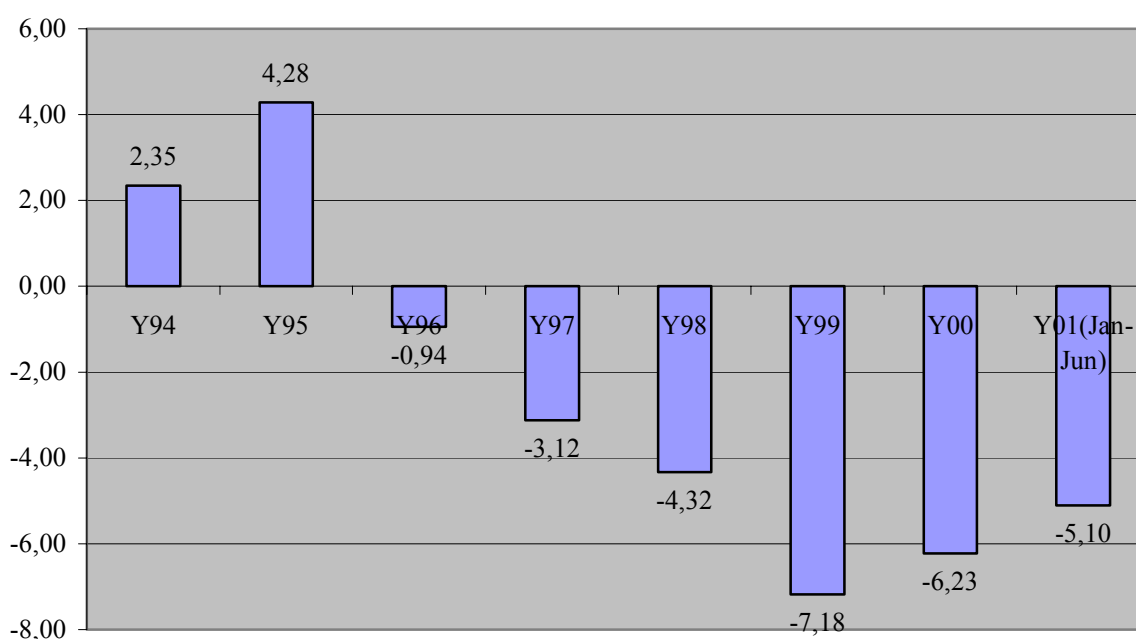
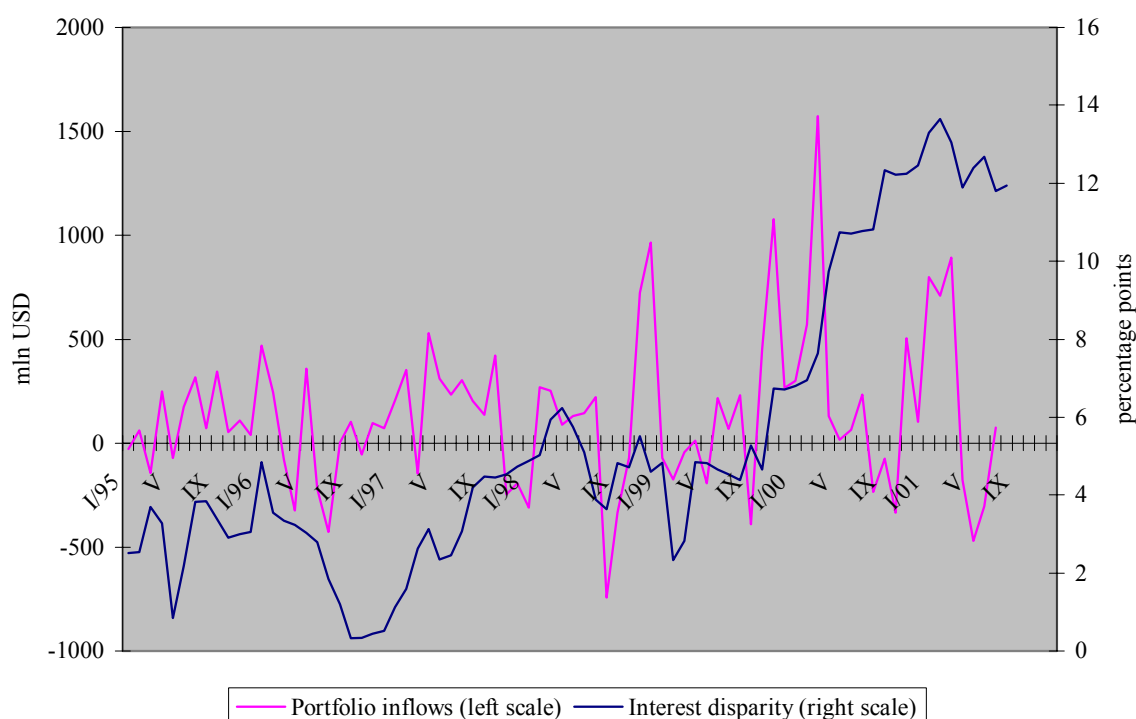


Figure 5 shows the interest disparity and portfolio capital inflows to Poland in 1995-2001. The interest disparity is measured here as the difference between the average rate of return on three-month Treasury Bills, reduced by the expected depreciation rate of the zloty (represented by the annualized pre-announced rate of crawl), and the three-month LIBOR rate (for USD). The average interest disparity in 1995-1998 was about 3 percentage points and it never dropped below zero. The disparity increased sharply to 12-13 percentage points in 2000 and started to narrow only in mid-2001⁴. The portfolio inflows is the sum of fixed-income investments and equity investments (up to 10% of total equity capital)

⁴ The crawling band for the exchange rate has been discontinued as of 12 April 2000 and the zloty has been under free float since then.

Figure 5
Interest disparity and portfolio inflows to Poland, 1995-2001



It is difficult to discover any significant statistical relationship between the two variables. In fact, portfolio inflows seem to be uncorrelated with the observed changes in interest disparity. Various estimations have demonstrated that some weak correlation could have been detected only for 1995-1997, but for the period 1998-2000 the correlation was actually negative.

Yet there is no doubt that the high relative yields on Polish securities have attracted foreign investors; this is also confirmed by data on large purchases of Polish bonds by foreign investment funds. But there certainly have been other factors that have blurred the picture. First, the level of investment risk tends to change frequently, especially in reaction to the changes in the balance of payments position of Poland and, more recently, also in the changes of the budget deficit. The risk of a currency crisis associated with the rapidly growing current account deficit in 1996-1999 largely neutralised the attractiveness of higher yields on fixed-income instruments. In result, the growing interest disparity did not result in more inflows. It should also be noted that the large purchases of bonds (or other securities) are frequently accompanied by parallel reductions in zloty-denominated account balances in commercial banks. When aggregate statistical data are used in the analysis, the two effects may largely cancel out. This effect could be detected in February-March 2000 and again in February-March 2001, when massive purchases of 2-year and 5-year T bonds coincided with the reduction of outstanding balances on bank accounts and – more recently – by cutting the outstanding zloty positions in swap transactions.

3. IMPLICATIONS OF CAPITAL INFLOWS FOR MONETARY AND FOREIGN EXCHANGE RATE POLICY

3.1. The Upward Pressure on the Zloty, Sterilised Interventions and Excess Liquidity

The rapid growth of capital inflows to Poland after 1994 strongly influenced nominal macroeconomic variables and affected the effectiveness of monetary and foreign exchange rate policies. Under the rigid foreign exchange regime that was in operation between 1990 and 1998, the central bank had no choice but to absorb the inflows, accumulate foreign reserves and, in order to avoid excessive increases of money supply, it had to substantially increase sterilization operations.

Massive capital inflows that started suddenly in 1995 provided a first serious test for the ability of the central bank in the so-far very successful transition country to effectively respond to an unexpected surge of capital inflows. The test was passed with enormous difficulties. Capital inflows to Poland at that time were primarily attracted by very low exposure of foreign investors in the Polish market and by high rates of return on government securities. In the last quarter of 1994 yields on 3-months Treasury Bills hovered around 27-28% and the expected rate of annual devaluation was about 18% (1.4% per month compounded), yielding an expected return in foreign currency on zloty-denominated investment of about 10%, well above the 3-month LIBOR (6.2-6.3%). The actual rate of return was even higher because the zloty tended to appreciate within the permitted band of fluctuations. The share of Polish securities in the portfolios of foreign investment funds could have been largely expanded because of improvement of Poland's creditworthiness, and foreign investors immediately responded to that new opportunity. Faced with the rapid growth of reserve money in result of capital inflows and concerned with the potentially inflationary impact of monetary expansion, the central bank first reduced the rate of crawl in February 1995 to 1.2% per month, and two weeks later raised interest rates by 2-3 percentage points. That was a serious policy mistake as both decisions have further increased the attractiveness of the zloty investments. As a result, the (uncovered) interest disparity widened and capital inflows further intensified.

In the first four months of 1995 inflows of foreign capital exceeded USD 2 bn; in addition, the strong export performance, including the so-called "non-registered transactions" further added to foreign exchange inflows⁵. In results, the international reserves increased by half to USD 9 bn, while net foreign assets of the banking sector jumped from USD 11.2 bn to 14.5 bn. In April alone the GOR increased by USD 1.5 bn. The NBP stepped up efforts to sterilise inflows, but it quickly became clear that if sterilisation operations would continue at that rate, the central bank would simply run into losses within few months.

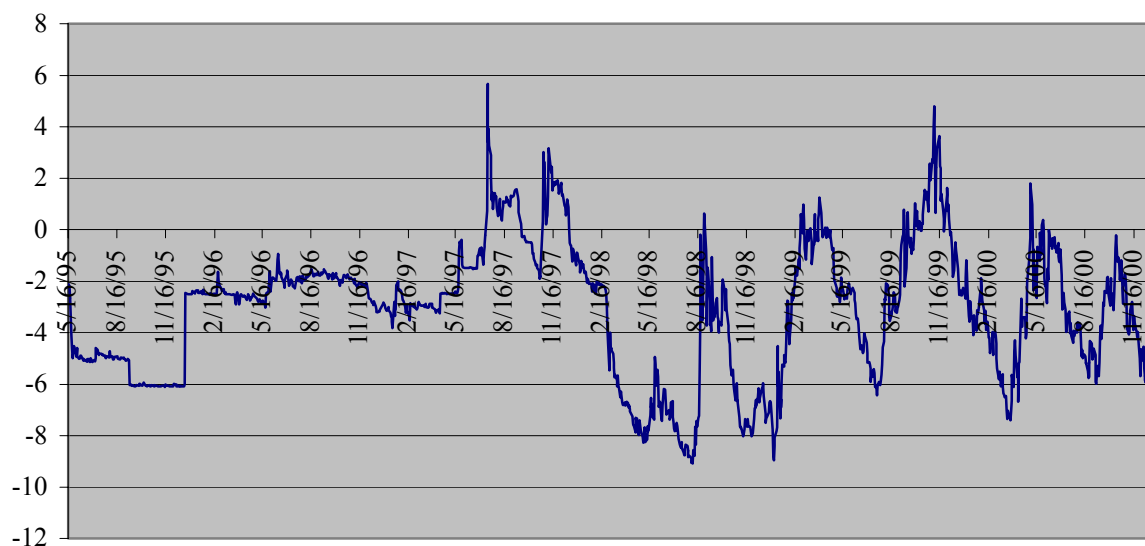
⁵ The "non-registered transactions" include mostly net surplus of purchases and sales of foreign currency by private exchange counters resulting from unregistered exports by individuals and purchases by foreigners, and changes on foreign currency accounts of individuals in Polish banks. Until 1995 this category was classified as "short-term capital movements", and only after 1995 it has been included in current account transactions.

In April the pressure on the złoty got so intense, that the central bank had no choice but first to widen the fluctuation band for the zloty from +/-2% to +/-7 percent in May 1995 and then in June also to lower interest rates by 4 percentage points in an attempt to reduce the upward pressure on the currency. The relief, however, was only temporary: foreign investors, encouraged by good growth and reform prospects, continued to buy Polish securities, buying especially debt instruments. Moreover, since the central bank was reluctant to let the zloty move widely across the whole larger band and tried to limit the fluctuations to a much narrower inner band, investors immediately began to speculate on the appreciation of the zloty. The central bank had to cut interest rates again in September, and in December it also decided to revalue the central parity of the band by 6% in December 1995. The speculation on the appreciation thus paid off. In the course of one year only gross official reserves of the central bank increased from USD 5.8 bn to almost 15 bn, chiefly in result of the interventions (see Table 1). Thus, the defence of the peg was not only unsuccessful, but also quite costly, as the sterilization operations cost the central bank almost USD 1 bn, or 0.8% of GDP.

Large capital inflows continued in 1996-1998, contributing to a steep increase of international reserves up to USD 27 bn in the end-1998. In fact, the actual inflows were even higher than the figures in Table 1 would suggest, because in 1996-1998 the current account balance switched from surplus to growing deficit. The capital inflows more than covered the growing current account deficit and supported the zloty rate consistently on the strong side of the central parity, frequently on the lower limit of the band. The behaviour of the zloty rate with respect to central parity in 1995-2000 is shown on Figure 6⁶.

Figure 6

Daily deviations of the fixing rate from central parity, May 1995 - December 2000, (%)



⁶ From October 1991 until end-1998 the zloty was fixed against the basket of currencies consisting of 45% of US dollar, 35% of Deutsche mark, 10% of British pound, 5% of French franc and 5% of Swiss franc. After the introduction of the euro on 1 January 1999 the basket was changed to 55% of euro and 45% of US dollar. The basket was discontinued when the zloty was floated in April 2000.

One important implication of the sterilised interventions under the controlled exchange rate was the accumulation of excess liquidity in the banking sector. The National Bank of Poland absorbed extra liquidity through open market sales of short-term NBP bills. The net amount of NBP bills outstanding increased from PLN 14.7 bn at the end of 1996 to 31.1 bn in February 1998 – more or less the equivalent of total cash in circulation. Despite the effort, broad money supply (M2) continued to increase at rates that were considered too high and inconsistent with the goal of reducing inflation to manageable levels. In the course of three years between end-1994 and end-1997, the annual rate of growth of M2 declined only marginally from 37% to 33%. Faced by constant difficulties in controlling the money supply, NBP had to resort to unconventional methods: it raised mandatory reserve requirements up to 20% for a vista deposits and even offered attractive deposit facilities for individuals in an attempt to shore up the excess liquidity. However, only when the exchange rate was eventually floated in 2000, the balance of reverse-repo operations declined to PLN 16-18 bn in the first half of 2001 and the liquidity problem got under control.

The changes in the exchange rate policy in Poland after May 1995 are illustrated on Figure 6 which shows the deviations of the exchange rate (złoty per basket of currencies) from central parity in percent (daily observations). Even though the złoty could formally fluctuate within the $\pm 7\%$ band since May 1995, the central bank maintained the rate strictly stable throughout 1995 at 5% and next at 6% from parity through daily interventions and fixing mechanism. More variability was introduced after revaluation in December 1995: for about eighteen months the exchange rate was allowed to fluctuate within a narrow band of $\pm 2\%$. The spikes observed in July and November 1997 were caused, respectively, by the disastrous flood in the summer and uncertainties surrounding the economic programme of the new government after the parliamentary elections in September.

3.2. The “Impossible Trinity”

The key error was obviously that the central bank attempted to simultaneously control three different variables: the exchange rate, the interest rate and the level of reserve money (the latter variable being the operational instrument to control inflation). This “eclectic” approach to monetary policy was possible for some time, when capital inflows were insignificant and the central bank was able to retain full control over monetary policy. However, the “eclectic” approach turned out to be increasingly ineffective after 1994. Under capital mobility, the three variables cannot be independently fixed by the central bank, and therefore at least one variable has to adjust. This is the familiar “impossible trinity”. If the level of the exchange rate is inconsistent with the level of interest rates to achieve a given inflation target, the resulting interest rate disparity will produce a tendency for capital inflows (or outflows). In that case, either the exchange rate, or the interest rate, or the level of reserve money has to adjust. And since the level of reserve money largely determines the level of inflation, the “impossible trinity” means that the central bank cannot simultaneously control the level of inflation and the level the exchange rate.

The following simple model illustrates the “trilemma”. If the central bank is responsible for maintaining price stability and capital is mobile internationally, the central bank can follow one of two principal monetary policy rules. The first one is the “direct inflation

targeting rule” (DIT) under which the central bank fixes a target inflation level for a specific time horizon and adjusts monetary policy instruments in such a way as to reduce inflation to the target level. In the process, the central bank prepares forecasts of inflation using all available information, including the observed past inflation. If the forecast shows that future inflation is likely to be above the target, the central bank tightens monetary policy, e.g. raising interest rates. If the forecast shows that inflation is likely to be below the target, the central bank can lower interest rates. Let i denote the level of nominal interest rates, r - the level of real rate of return on capital, p - inflation, π - the inflation target, y - the actual level of output, and y_{\max} - the full capacity level of output. An asterisk (*) denotes foreign variables. Then the DIT rule can be formalised in form of a “reaction function” of the central bank:

$$(1) \quad i = i^* + (r - r^*) + (p - p^*) + a(y - y_{\max}) + b(p - \pi)$$

or in a simplified notation:

$$(1a) \quad i = \Delta + b(p - \pi)$$

Formula (1) shows that under the DIT rule the level of domestic nominal interest rates depends on the level of foreign interest rates, the difference between the rates of return on capital abroad and at home, the difference between inflation rates abroad and at home, the “gap” between the actual and potential output and the difference between the current inflation and the target inflation. The last element is crucial as it determines the short-term reaction of the central bank to the difference between actual and target inflation. The higher is the parameter b the stronger is the reaction of the central bank and the more restrictive is the stance of monetary policy.

The second rule is the “exchange rate targeting rule” (ERT) under which the central bank chooses a certain target level of the exchange rate that is considered to be consistent with a desired level of inflation. Under this rule, the exchange rate either is fixed or it is adjusted in a pre-determined way, e.g. as a crawling peg or a crawling band. This rule implies that the central bank has only limited control over domestic interest rates as their level is largely determined by the exchange rate target, $\varphi(T)$.

$$(2) \quad i = \Omega + f[\varphi(T)]$$

where Ω is a constant. Under a fixed peg or a fixed rate of crawl the central bank defends the target exchange rate through unlimited interventions on the foreign exchange market. The monetary impact of interventions is typically sterilised to avoid unwanted changes in money supply. The central bank has only limited choice in setting the level of interest rates: if the interest rates are too high they would attract more capital and require more sterilisation which can only be done at even higher interest rates. When the interest rates are too low, the ensuing outflow of capital would drain international reserves of the central bank and may lead to a major currency crisis.

In an open economy with capital mobility capital flows depend on the interest rate parity, i.e. the rate of return earned on domestic currency denominated assets adjusted by the

expected change of the exchange rate. The interest rate parity (in an uncovered form⁷) can be written as follows:

$$(3) \quad i = i^* + \frac{\varphi - \varphi(e)}{\varphi} + c$$

or in a simplified notation

$$(3a) \quad i = i^* + d(\varphi) + c$$

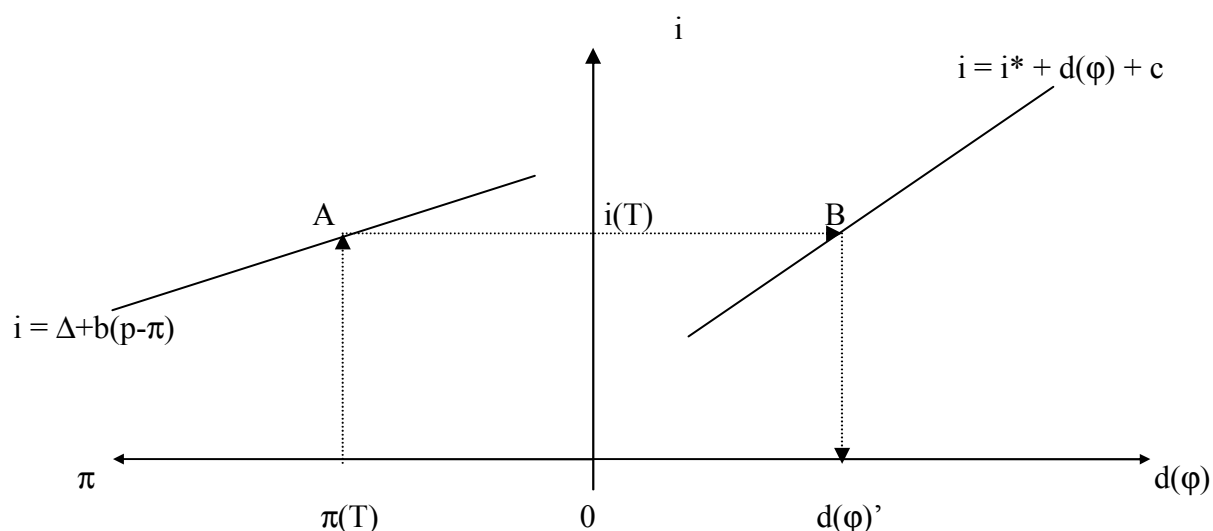
where $d(\varphi)$ is the expected rate of depreciation of the domestic currency and c is the measure of risk involved with holding domestic currency denominated assets. If the parity holds, no capital flows take place - but this is not a frequent situation. Normally equation (3) does not hold because of continued changes in the value of the risk factor because the changes in interest rates generally lag behind the changes in the risk factor. When the resulting disparity is positive, foreign capital flows into the country, and when the disparity is negative there is a net capital outflow. Note that the described relationship holds primarily for fixed-income investment, i.e. for capital flows that are sensitive to changes in interest rates. The impact of disparity on movements of other capital categories, including equity investment, is generally much weaker and less direct.

The selection of the inflation target $\pi(T)$ determines the required level of interest rates, $i(T)$, through equation (1), and the level of interest rates determines the expected change in the exchange rate, $d(\varphi)$, through equation (3). Alternatively, the selection of the target exchange rate, $d(\varphi)$, determines the level of interest rates and then the level of expected inflation. Clearly, it is impossible to decide independently and simultaneously on the inflation level and on the exchange rate level. Capital mobility links the two variables through the interest rate parity and the central bank can only control one variable, leaving the other one to be determined by the market.

Equations (1)-(3) demonstrate that the level of interest rates – irrespective of the monetary rule adopted - is simultaneously determined by two entirely different sets of variables. This is the gist of the “impossible trinity”. The conflict between the variables can conveniently be presented in a graphical form in Figure 7.

⁷ The “uncovered parity” ignores the possibility of hedging against the exchange rate risk with a swap transaction.

Figure 7
The „impossible trinity”



How has this “trilemma” been solved in Poland under the “eclectic” policy rule? A plausible answer can be derived from the analysis of Figure 6 and from data on inflation. It can be seen that the NBP was generally successful in keeping the zloty rate within the established band. But Figure 6 also reveals that the actual band of permitted fluctuations was narrower than the official band and therefore the regime was in fact more rigid than officially presented. After the band was officially widened to $\pm 7\%$ in May 1995, the exchange rate was not allowed to move across the whole band. Between May and September the “inner” limit on the stronger side of the parity was only 5%, and between September and December it was increased to 6%. After the revaluation of the central parity in December 1995, the exchange rate was never allowed to deviate by more than 4% from central parity. Clearly, the market could always detect the actual “inner” band defended by the NBP and speculate accordingly.

According to the logic of the “impossible trinity”, the strong commitment of NBP to defend the exchange rate level must have been incompatible with its commitment to reach the predetermined inflation targets. Indeed, the record of disinflation in that period is rather poor. As demonstrated by figures in Table 4, never in the period 1990-1997 was the central bank able to fulfil its own inflation targets – the actual inflation was always higher. This shows that, in practice, the NBP was able to achieve only one goal – and it deliberately chose the exchange rate level, not the inflation level.

Table 4

Effectiveness of monetary policy under the “eclectic” approach: inflation targets and actual inflation in Poland, 1990-1997 (in %, December to December)

Year	Inflation target	Actual inflation
1990	95.0	245.0
1991	32.0	60.4
1992	36.8	44.3
1993	32.2	37.6
1994	23.0	29.5
1995	17.0	21.6
1996	17.0	18.5
1997	13.0	13.2

Source: NBP

3.3. Capital Inflows and the Variability of the Exchange Rate in 1998-2001

In February 1998, the band for fluctuations was substantially widened and the scope of interventions significantly reduced. With the adoption of the direct inflation targeting framework in monetary policy since the beginning of 1999, the central bank announced also its intention to discontinue the crawling peg system altogether and to free float the national currency. The decision to float the zloty was taken in April 2000 – the central parity against the basket of currencies and the band of permitted fluctuations around the parity have been eliminated. But the zloty has been practically free already since July 1998, as the central bank has refrained from intervening in the foreign exchange market⁸.

The behaviour of the exchange rate in Poland after the policy change in February 1998 is illustrated on Figure 6 which shows the deviations of the exchange rate (zloty per basket of currencies) from central parity in percent (daily observations)⁹. The appreciation of the zloty in the first half of 1998 reflects the change of policy (the widening of the band to +/-12.5%) under large capital inflows while the depreciation in August 1998 shows the impact of the Russian crisis. A shift from the stronger side to the weaker side of the parity in 1999 reflects

⁸ Between July 1998 and June 1999, the NBP did not buy or sell foreign exchange in regular forex transactions, but left open a possibility for banks to adjust their currency positions at the “fixing” rate after each trading day. The system virtually eliminated the currency risk as the banks could always close their positions with the central bank at a rate that was pre-determined each day. The “fixing” session for banks was discontinued in June 1999. Since then the NBP did intervene only once and for a very small amount (less than USD 1 million). The option to intervene, however, remains open but is not used.

⁹ As the central parity was eliminated on 12 April 2000, the deviations after that date have been calculated as deviations from the hypothetical central parity level depreciated every month by 0.3%.

deteriorating sentiments about the Polish market because of growing current account deficit, higher inflation and political conflicts in the ruling coalition¹⁰.

The decision to float the zloty was consistent with the adopted direct inflation targeting rule of monetary policy. It allowed for stabilizing the level of international reserves thus eliminating the most important source of excess liquidity in the domestic banking system and allowed the NBP to restore control over money supply. All capital inflows and outflows have been going through the forex market and the changes in flows were fully reflected in the corresponding fluctuations of the exchange rate.

Table 5 shows some measures of variability and volatility of the foreign exchange rate in Poland. Variability is measured by the standard deviation of differences between the daily fixing and the central parity, while volatility is measured by the difference between the maximum and minimum deviation of the fixing from the central parity. As can be seen, both measures have increased broadly in line with the width of the band and with the size of capital inflows.

Table 5
Deviations of the exchange rate from central parity, 1995-2001, in %.

Year	Mean deviation %	Standard deviation	Volatility a)	Capital inflows USD mln
1995	-5.33	0.881	3.967	4980
1996	-2.22	0.413	2.267	4422
1997	-0.96	1.888	9.508	7842
1998	-5.59	2.418	9.713	12565
1999	-1.90	2.552	13.760	8206
2000	-3.34, b)	1.804	9.187	7905
2001, c)	-13.72, b)	2.892	9.918	3291

a) $e(max) - e(min)$ /

b) Assuming 0.3% devaluation per month

c) January-June

One interesting observation from table 5 is that the variability of the exchange rate initially diminished after the zloty was floated in April 2000. Both measures of variability (standard deviation and the difference between maximum and minimum deviation) increased somewhat in the first half of 2001, but they were not much different from the values observed in 1999. At the same time capital inflows diminished as the increased exchange rate risk reduced incentives to invest in zloty denominated assets. This episode provides a prima facie evidence that fears of floating may in most cases be exaggerated (Calvo and Reinhart, 2000).

¹⁰ As a result, the deviations of the exchange rate from central parity have not followed a random walk, but they have displayed strong non-stationarity. The results of the ADF test for stationarity of daily deviations are given in Annex C.

Another observation is that the average deviation from central parity also declined after the widening of the band in 1998. Interventions by the National Bank of Poland on the foreign exchange market were discontinued after June 1999 and as a result capital inflows diminished. This may be yet another confirmation of the hypothesis that the very existence of a rigid exchange regime with a relatively narrow band of fluctuations reduces the exchange rate risk and encourages foreign investors to buy more domestic securities, thereby increasing inflows and putting more pressure on the central bank.

3.4. The Composition of Capital Inflows and the Role of Interest Rates

As explained earlier, a large interest rate disparity induces capital inflows into fixed income instruments. These inflows need to be sterilised under a fixed exchange rate regime, or result in nominal appreciation of the national currency under a floating rate regime. It is sometimes argued that the continued policy of high interest rates by the NBP after the change of the exchange rate regime in 1998 could therefore contribute to increased capital inflows and lead to appreciation.

In addressing this issue it is important to distinguish between capital inflows that are sensitive to the changes in interest rate disparity and inflows that do not depend on these changes. The first category of capital inflows includes investments in debt instruments such as fixed-income instruments (Treasury Bills, Treasury Bonds, corporate bonds, municipal bonds), credits extended by foreign banks to domestic companies and banks, and investment in other financial instruments such as time deposits and derivative transactions (swaps). The second category encompasses investments in equity instruments, both portfolio investment and direct foreign investment in form of green-field investment and mergers and acquisitions, including privatisation transactions. Of course, only the first category of capital inflows directly depends on the interest rate disparity.

Figure 8
Monthly net capital inflows to Poland, by category, 1997-2001 (mln USD)

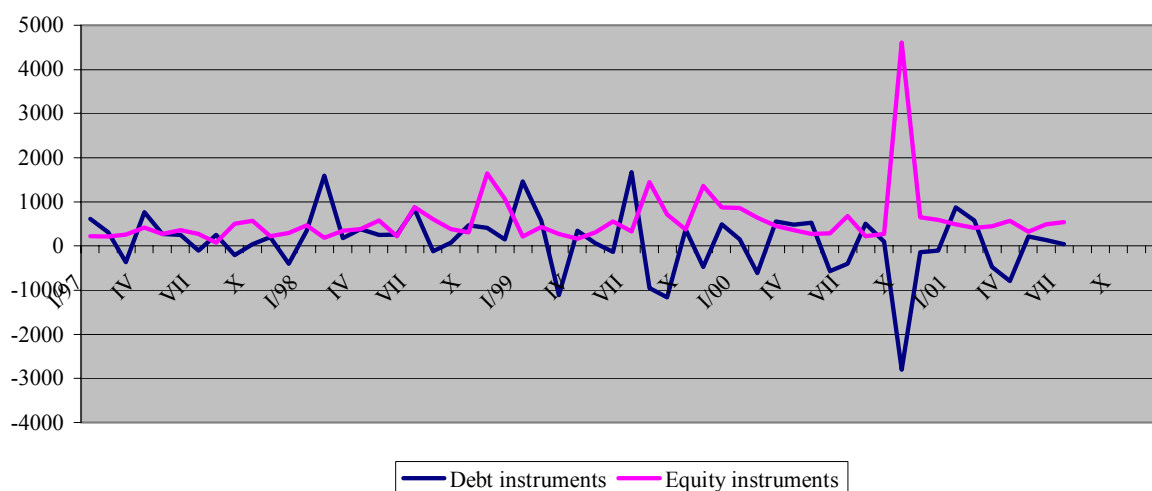


Figure 8 shows the monthly amounts of net capital inflows in debt instruments and equity instruments between January 1997 and June 2001. As can be seen, foreign investments in debt instruments have been generally lower and much more volatile than investments in equity instruments. Table 6 provides summary figures. The monthly average inflows in debt instruments in 1997-1999 were 2-3 times lower than inflows in equity instruments. In 2000, the absolute amount of investments in debt instruments was actually negative. By contrast, investments in equity instruments have been growing steadily, exceeding USD 9 bn in 2000. The same pattern seems to continue also in 2001.

Table 6
Capital inflows to Poland(1997-2001, US\$ mn)

Year	Fixed income instruments			SD /mean	Equity investment			SD /mean
	mln USD	Mean	St.Dev.		mln USD	Mean	St.Dev.	
1997	1619	135	362	2,68	3696	308	137	0,44
1998	4851	404	442	1,09	7079	590	423	0,72
1999	1146	96	923	9,66	7060	588	435	0,74
2000	-2006	-193	924	-4,78	9911	826	1210	1,47
2001(I-VI)	553	92	626	6,80	3282	547	87	0,16

Source: National Bank of Poland

Figure 9 shows the changes in the nominal exchange rate, measured in terms of zlotys per 50:50 basket of US dollar and euro, in 1998-2001. The variability of the nominal rate increased after the band was widened in February 1998, but the variations have not been excessively large. Over three and a half years the exchange rate has never gone above 4.4 PLN/basket and below 3.6 PLN/basket - a behaviour that would be exactly equivalent to a +/- 10% band around a (hypothetical) parity of 4 PLN/basket. The fluctuations essentially followed political and macroeconomic developments in Poland and on international markets.

Figure 9

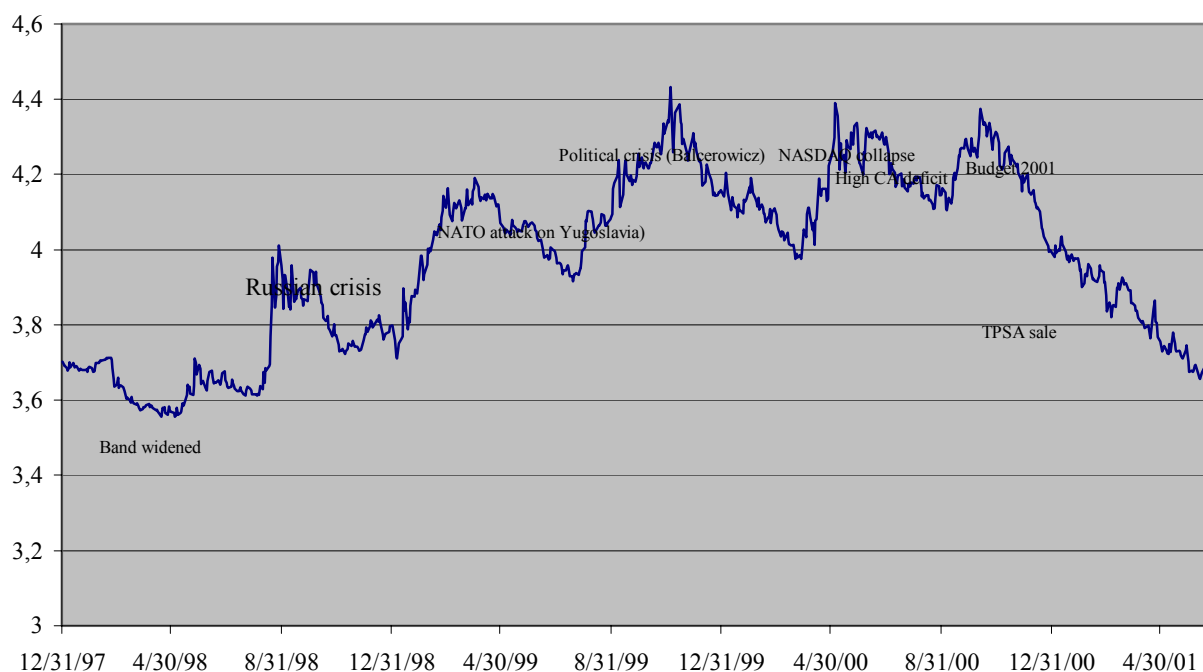
PLN against the basket (50% USD + 50% EUR), daily quotations, Jan 1998 - Jun 2001

Table 7

Episodes of appreciation: the impact of capital inflows

Period	Nominal appreciation %, a)	Inflows in debt instruments mln \$	Inflows in equity instruments mln \$
IX/98 – X/98	4.7	549	687
IV/99 – VI/99	3.9	274	1062
XI/99 – III/00	6.7	118	4197
V/00 – VIII/00	5.5	47	1461
X/00 – VI/01	15.8	-2498	8605

a) Złoty against the basket of USD and Euro (50%:50%)

Source: National Bank of Poland, own calculations

When examined jointly, Figures 7 and 8 clearly demonstrate that periods of nominal appreciation of the złoty did only remotely coincide with periods of increased inflows into debt instruments. In Table 7, the relevant data are collected for five episodes of nominal appreciation. The picture is clear: nominal appreciation was caused by massive inflows into equity instruments, chiefly by FDI connected with large privatisation transactions (e.g. TPSA sale). Inflows into debt instruments contributed only marginally, and - for the last and longest appreciation period - their impact on appreciation must actually have been negative. High

domestic interest rates cannot therefore be responsible for the nominal appreciation of the zloty.

4. AN “ECLECTIC” POLICY RULE UNDER CAPITAL MOBILITY: STATISTICAL ANALYSIS OF THE POLISH CASE

4.1. The Analytical Framework

Pursuing the policy of exchange rate–based stabilization in 1990-1998, the National Bank of Poland tried to keep the rate of the zloty within a relatively narrow band. At the same time, NBP tried to reach the established monetary and inflation targets. As already mentioned, under capital mobility such an “eclectic” policy may be internally inconsistent. Two dilemmas immediately emerge. First, sterilization of growing capital inflows requires higher domestic interest rates that attract even more foreign capital, rendering central bank’s efforts to reduce growth of money supply largely ineffective. Second, slowing down the rate of crawl reduces the inflationary impact of devaluation but at the same time raises the expected rate of return on zloty-denominated assets. This again attracts more capital and may work pro-inflationary. The two dilemmas will be illustrated with the Polish data.

The fundamental identity of the consolidated balance sheet of the banking system links broad money supply (M2) with three main sources of money creation – domestic credit (DC), credit to government (BC), and net foreign assets (NFA):

$$(4) \quad M2 = DC + BC + NFA + \text{residual}$$

Taking changes and assuming residual = const., one obtains:

$$(5) \quad \Delta M2 = a(\Delta DC) + b(\Delta BC) + c(\Delta NFA)$$

With some simplification, changes in domestic credit (DC) can be expressed as a function of the level of domestic interest rates, i , and the level of income, Y :

$$(6) \quad \Delta DC = f(i, Y)$$

$$\delta f / \delta i < 0, \delta f / \delta Y > 0$$

Changes in net foreign assets (NFA) can be presented as a function of foreign capital inflows, including foreign direct investment (FDI) and portfolio investment and other capital inflows (PIOC), and the current account balance (CA):

$$(7) \quad \Delta NFA = k(\Delta FDI) + m(\Delta PIOC) + nCA + \varepsilon$$

FDI inflows can be assumed exogenous as they do not directly depend on monetary variables, but rather on the overall investment climate and growth prospects of the economy. By contrast, other inflows depend on the expected rate of return and the risk level. Defining

the expected rate of return as (uncovered) interest disparity and approximating the risk level with the level of gross official reserves (GOR), PIOC can be expressed as follows:

$$(8) \quad \Delta PIOC = g [(i - i^* - d(\varphi)), GOR],$$

$$\delta g / \delta (i - i^* - d(\varphi)) > 0, \delta g / \delta (GOR) > 0$$

Where i^* is foreign interest rate and $d(\varphi)$ is the expected annual rate of devaluation of the zloty. To close the model, it is necessary to link inflation (CPI) with money supply and expected devaluation:

$$(9) \quad CPI = p [M2, d(\varphi)],$$

$$\delta CPI / \delta M2 > 0, \delta CPI / \delta d(\varphi) > 0$$

At this stage it is assumed that no sterilisation takes place. This assumption is relaxed in section 4.3.

4.2. Estimation Results

Equations (5) – (9) have been estimated from 39 monthly observations covering the period January 1995 – March 1998¹¹. Equation (5) has been estimated in two specifications: in the first variant (equation 10) net foreign assets are expressed in zloties (PLN) and in the second variant (equation 11) NFA is in dollars (USD) and the exchange rate (FER) is added as an additional variable.

As all variables representing monetary aggregates (M2, NFA, DC, BC) are expressed in terms of cumulative amounts, this involves non-stationarity of those variables. Testing for stationarity with the Augmented Dickey-Fuller test – ADF – has shown that in both specifications of equation (5) all variables (except NFA_{USD}) are non-stationary at 5% level. To check whether the OLS estimation procedure is allowed under these circumstances, the Johansen test for cointegration was performed for both equations. The test gave a negative result for the first equation and a positive result for the second equation. First equation has therefore been transformed into first-differences (for which the ADF test showed stationarity), while the second equation has been left unchanged. The results of estimation are as follows (t-statistics in brackets):

$$(10) \quad \Delta M2 = 832.5 + 0.485 \Delta DC + 0.87 \Delta BC + 0.498 \Delta NFA_{PLN}$$

(1.72)	(2.45)	(7.38)	(4.63)
$R^2 = 0.636$		$F(stat) = 19.80$	
$Adj. R^2 = 0.604$		$DW = 2.61$	

¹¹ In February 1998 the central bank changed its foreign exchange policy allowing for much wider fluctuations of the exchange rate and reducing the size of intervention.

$$(11) \quad M2 = -27030 + 0.895 DC + 0.571 BC + 1.797 NFA_{USD} + 8197 FER$$

$$\quad \quad \quad (-4.75) \quad (15.82) \quad (5.10) \quad (17.45) \quad (2.95)$$

$$R^2 = 0.999 \quad \quad \quad F(stat) = 8404.5$$

$$Adj. R^2 = 0.999 \quad \quad \quad DW = 1.24$$

In estimating the remaining equations the following assumptions have been made with respect to the relevant variables:

- the domestic interest rate is represented by the rate of return on three-month Treasury Bills (on primary auctions);
- the foreign interest rate is represented by the three-month LIBOR on US dollars;
- expected devaluation is measured by the current monthly rate of crawl compounded for 12 months;
- monthly income levels are measured by monthly changes in the index of industrial production (IND), as monthly GDP figures are not available;

It was also assumed that both the domestic credit (DC) and capital inflows (PIOC) react to the changes in the interest rate with a three month lag, while CPI reacts to the changes in M2 with a six month lag¹². Equation (6), first estimated in a simple general form:

$$r(DC) = a + b IND + c i(-3)$$

showed very high autocorrelation (DW = 0.31). Through an autoregressive correction the equation has been transformed into the following one¹³:

$$(12) \quad r(DC) = 55.99 - 0.03 IND^* - 0.784 i(-3)^* + 0.925 r(DC, -1)$$

$$\quad \quad \quad (5.17) \quad (-0.56) \quad (-1.67) \quad (13.97)$$

$$R^2 = 0.918 \quad \quad \quad F(stat) = 115.1$$

$$Adj. R^2 = 0.910 \quad \quad \quad DW = 1.29$$

The results for the three remaining equations are as follows (Δ s omitted for simplicity):

¹² These time lags have been selected because they displayed best statistical properties.

¹³ Autoregressive correction allows for eliminating most of autocorrelation of the error term from the original equation and thereby increases efficiency of structural parameters. The original regression equation:

$$Y(t) = a + b X(t) + u(t)$$

with an autocorrelation process of a general form:

$$u(t) = \rho u(t-1) + \varepsilon(t), \text{ and: } \rho \neq 0$$

is transformed into an autoregressive equation:

$$Y(t) = \rho Y(t-1) + b X^*(t) + \varepsilon(t),$$

where: $X^*(t) = X(t) - \rho X(t-1)$. Note that the autoregressive correction does not change the interpretation of structural parameters.

$$(13) \quad \text{NFA} = -186.1 + 1.78 \text{ FDI} + 0.694 \text{ PIOC} + 1.24 \text{ CA}$$

$$\quad \quad \quad (-1.99) \quad (4.91) \quad (7.70) \quad (10.44)$$

$$\text{R}^2 = 0.790 \quad \quad \quad \text{F(stat)} = 43.9$$

$$\text{Adj. R}^2 = 0.772 \quad \quad \quad \text{DW} = 1.77$$

$$(14) \quad \text{PIOC} = -5638 + 855.4 \text{ DISP} + 0.614 \text{ GOR}(-3)$$

$$\quad \quad \quad (-6.81) \quad (6.32) \quad (12.82)$$

$$\text{R}^2 = 0.876 \quad \quad \quad \text{F(stat)} = 117.0$$

$$\text{Adj. R}^2 = 0.869 \quad \quad \quad \text{DW} = 0.64$$

$$(15) \quad \text{CPI} = -23.67 + 0.552 \text{ rM2}(-6) + 1.784 \text{ d}(\varphi)$$

$$\quad \quad \quad (-6.57) \quad (6.33) \quad (6.02)$$

$$\text{R}^2 = 0.833 \quad \quad \quad \text{F(stat)} = 74.6$$

$$\text{Adj. R}^2 = 0.821 \quad \quad \quad \text{DW} = 0.62$$

where $\text{DISP} = i - i^* - d(\varphi)$ and rM2 is the rate of growth of broad money. Equation (14) has two important shortcomings: non-stationarity of PIOC and GOR, and high autocorrelation of the error term. Non-stationarity does not have to disqualify an equation provided the variables are co-integrated. The Johansen cointegration test confirms the existence of at least one co-integrating equation, which allows to use (14) in its present form. As far as autocorrelation is concerned, autoregressive correction could not be performed neither for (14) nor for (15) as it yielded non-convergence of parameters. Therefore, equations (14) and (15) have to be interpreted with great caution.

The results obtained allow for assessing – in a comparative statics framework - the impact of changes in the control variables, i.e. domestic interest rate and the rate of crawling devaluation, on money supply and inflation. Table 8 provides a summary of this exercise. As can be seen, under the assumption of a fixed exchange rate (or a fixed crawling rate) and in the absence of sterilization, capital inflows may lead to a “perverse” effect of interest rates changes: an increase of the interest rate by one percentage point may actually lead to an increase, rather than a decrease, of the inflation rate by 0.22-0.23 percentage point. By contrast, a reduction of the rate of crawl by one percentage point unambiguously reduces inflation by 1.32-1.42 percentage point. Obviously, it should be remembered that this is a short term and comparative static result.

Table 8

Poland: Impact of changes interest rates and expected devaluation on money supply and inflation under capital mobility

Equation(s)	Control variables		Endogenous variables					Impact on inflation Δ CPI (percent. pts.)
	Δi	$\Delta d(\phi)$	Δ (PIOC)	Δ NFA	Δ DC	Δ M2	rM2	
	(percent. pts.)		(\$ mln)		(PLN mln)			
Changes in the interest rate								
7,10,11,12	+1	-	855	594	-	844	0.66	0.36
8,10,11,12	+1	-	855	594	-	1067	0,83	0,46
7,9,12	+1	-	-	-	-615	-298	-0.23	-0.13
8,9,12	+1	-	-	-	-615	-550	-0.43	-0.24
Neteffect	+1							0.22+0.23
Changes in the rate of crawl								
15,13,10,16	-	-1	835	594	-	844	0.66	0.36
15,13,11,16	-	-1	835	594	-	844	0.83	0.46
16	-	-1	-	-	-	-	-	-1.78
Neteffect	-	-1						-(1.32+1.42)

Source: Own calculations

4.3. The Impact of Sterilization

Of course, central banks do not sit idle in the face of large capital inflows. They typically resort to sterilization operations, trying to reduce the monetary impact of capital inflows. But the efficiency of those operations may be very limited. Consider a simple model of capital flows introduced first by Kouri and Porter (1974).

$$(16) \text{ CI} = \alpha \Delta \text{NDA} + b \Delta i^* + c \text{ CA} + d \Delta Y + \varepsilon$$

Where NDA – net domestic assets of the central bank, and α is the offset coefficient which measures the reaction of capital inflows to the changes in the level of sterilization operations. A fall in NDA means that the central bank sells securities to the banking sector, thereby reducing the supply of reserve money. As sterilization induces capital inflows, α should have a negative sign. A high (absolute) value of α means that sterilization is largely ineffective.

Model (16) assumes that the exchange rate is constant. In order to apply the model to the conditions of an economy with an adjustable peg regime, CI needs to be decomposed into two variables – one measuring the changes in the exchange rate (CIFEX) and another measuring the “pure” changes in capital inflows (CIN) under a fixed exchange rate (of course, $\text{CI} = \text{CIFEX} + \text{CIN}$). Defining CI as a cumulative increase in gross official reserves, Y as an index

of industrial output (average monthly in 1994 = 100), and i^* as the three month LIBOR, equation (16) has been estimated for the period from January 1995 to March 1998. The results, after allowing for autoregressive correction (variables after correction are marked with an apostroph '), are shown in (17):

$$(17) \quad \text{CIN} = 8416 - 0.561 \text{NDA}' - 0.215 \text{CIFEX}' - 540.5 i^* + 1.131 \text{CA}' + 46.95 \text{Y}' + 0.896 \text{AR}(1)$$

(1.15) (-6.08) (-1.03) (-0.49) (2.72) (2.40) (23.18)

$$\begin{array}{ll} R^2 = 0.995 & F(\text{stat}) = 983.9 \\ \text{Adj. } R^2 = 0.994 & \text{DW} = 2.05 \end{array}$$

The offset coefficient ($\alpha = -0.561$) suggests that an increase in the level of sterilization operations by, say, PLN 1 billion entails a "secondary" inflow of capital of about PLN 0.56 billion. Adding to that the effects of systematic devaluation, the monetary implications expressed in terms of zlotys are even larger. Since the sum of coefficients in NDA and CIFEX is about 0.78, this suggests that sterilization operations were in fact neutralized in 75-80% by additional capital inflows.

The magnitude of sterilization operations depends on a variety of policy factors that typically can be jointly represented in the form of a certain reaction function of the central bank (18):

$$(18) \quad \text{NDA} = -\beta \text{CI} + \varepsilon$$

where β is the reaction coefficient (Δ s are omitted). If $\beta = 0$, the central bank refrains from sterilization; if $\beta = 1$, each unit of incoming capital is fully sterilized with a corresponding decrease in net domestic assets of the central bank. Decomposing CI into CIFEX and CIN, estimating for the same time period as for the previous model, and allowing for autoregressive correction, one obtains:

$$(19) \quad \text{NDA} = 4267 - 0.855 \text{CIN}' - 0.968 \text{CIFEX}' + 0.324 \text{AR}(1)$$

(5.39) (-21.68) (-15.86) (1.99)

$$\begin{array}{ll} R^2 = 0.996 & F(\text{stat}) = 2853 \\ \text{Adj. } R^2 = 0.995 & \text{DW} = 2.01 \end{array}$$

The reaction coefficient ($\beta = -0.855$) shows that out of each PLN billion of capital inflows the central bank sterilized on average PLN 855 million. Substituting (18) into (17), one obtains a measure of full impact of sterilization on capital inflows (see, e.g. Bond, 1998).

$$(20) \quad \text{CIN} = [1/(1-\alpha\beta)] (\text{a G})$$

or

$$(21) \quad \text{CIN} = 1.922 (\text{a G})$$

Where G stands for the sum of other variables (CIFEX, i^* and Y). Equation (21) shows that the sterilisation by the Polish central bank of autonomous capital inflows induced by a

change in the components of G increased these inflows through a cumulative process broadly by a factor of 1.9.

5. NEW CHALLENGES AND SUGGESTED POLICY RESPONSES

5.1. The Choice of an Exchange Rate Regime in the Transition Period to EMU

Poland, along with many other countries of central and east Europe, wants to gain membership in the European Union within next 3-4 years and also intends to join the Economic and Monetary Union as soon as practically possible. According to the provisions of the Maastricht Treaty of 1992 and in line with the decision of the EU summit in Copenhagen in 1993, the candidate countries will have obligatory join the EMU after their accession to the EU. The economic and political conditions for accession as formulated at the Copenhagen summit included, among others, the requirement for the candidate countries to be able to assume a wide range of obligations arising from full membership, including membership in the monetary union. No “opt-out” clause was offered to new members – by contrast to some incumbent members (Denmark).

The provisions of the Maastricht Treaty imply that new members can join the EMU only after they have met a set of criteria for nominal convergence – the so-called Maastricht criteria. Moreover, the membership can be gained not earlier than two years after a new member has joined the EU¹⁴. Prior to EU accession candidate countries are free to adopt the exchange rate regime of their choice. However, in the transition period between gaining EU membership and joining the EMU, the new members are expected to enter ERM-II. The Treaty thus attempts to establish an explicit link between the speed of the accession process for EU membership and the speed of approaching the EMU, and to define a specific financial convergence path for the candidate countries.

The ERM-II does not require any specific exchange rate regime prior to joining the EU. Any regime can be seen compatible in the transition period to ERM-II. Poland has therefore basically three options for the transition period: to maintain the float, to switch to a fixed rate regime, or to re-introduce a sort of an intermediate solution – e.g. a fixed or crawling band. It will be argued that the two latter options are not recommended for the Polish economy.

Pegging the national currency to a currency of the main trading partner seems to be a reasonable solution because it offers stability, but it involves a number of risks that may even be fatal. First, if a transition country trades with and borrows from different partners with different currencies, changes in nominal cross-rates may provoke wide changes in real values, undermining the financial position of exporters. More importantly, massive swings of international capital put enormous pressures on the fixed exchange rate and may overwhelm

¹⁴ „The criterion of participation in the Exchange Rate Mechanism of the European Monetary System ... shall mean that a Member State has respected the normal fluctuation margins provided for by the Exchange Rate Mechanism of the EMS without severe tensions for at least the last two years before the examination...” (Protocol on the Convergence Criteria as Mentioned in Article 109F of the Maastricht Treaty, Article 3, emphasis added).

the currency. A pegged rate regime requires a higher level of international reserves; but this is costly and - by itself - does not provide a guarantee of stability.

The series of recent financial crises provides a clear and valuable lesson on the inherent risks involved with fixed exchange rate regimes. Virtually all crises - from Mexico and the Czech Republic to East Asia, Russia and, more recently Turkey - took place in countries with pegged foreign exchange rates. True, there were different underlying reasons behind the crises, including weak fundamentals and macroeconomic mismanagement in the first place, but the fixed exchange rate deprived the countries concerned necessary flexibility to make appropriate adjustments when hit by external or internal shocks. Even a currency board does not seem to be a “waterproof” solution, as demonstrated by turbulences in Argentina, where the currency board did not prevent the national currency from coming under intensive speculative pressure and the authorities contemplated even abandoning the peso altogether and the switch to the US dollar. After all, the currency board - though legally more binding than a regular fixed rate - is still a unilateral peg that can be revoked by a unilateral decision.

The key problem in ensuring the stability of the pegged regime is that of credibility. Full credibility practically removes any risk of speculation. But credibility is an elusive goal and one that is not given forever. In the first place, credibility of commitment to maintain the fixed rate depends on the form of the peg. A currency board is generally considered as a more credible system than a conventional peg, because it is legally more binding and its change typically requires lengthy parliamentary procedures. This is why some authors have suggested a currency board as an optimal arrangement for the candidate countries, as a prelude to unilateral euroisation (Mundell, 2000). Second, credibility of commitment depends on the overall policy stance. Generally, if the macroeconomic policies are considered by market players as imprudent and unsustainable in the longer run, the market will increasingly expect depreciation of the national currency. This in turn will trigger speculative behavior by investors and, unless the policies are credibly corrected, the exchange rate regime will collapse. This mechanism has been described by Krugman (1979).

But even if the macroeconomic policies are correct, the market may still consider that government’s commitment to defend the exchange rate as not credible enough. If the government is politically weak, or its policies are likely to lead to increased unemployment and may provoke massive social protests, the ability of the government to defend the exchange rate will necessarily be reduced. In that case, market players expect a policy shift leading to an eventual devaluation, and will behave accordingly, increasing a downward pressure on the pegged currency (Ozkan, Sutherland, 1994; Drazen, Masson, 1994; Obstfeld, 1994). This case is relevant for transition countries where currencies have been weak and political stability relatively low. The very prospect of devaluation gives an obvious incentive for market players to anticipate events and to attack the currency. One important implication of this model is that speculative attacks can be self-fulfilling. Another is that a financial crisis may strike even the countries with sound economic policies, either through a „contagion effect” (e.g. if a devaluation in one country threatens the competitiveness of its neighbors), or through a sudden shift in market sentiments. Von Hagen (2000) argues that the usefulness of a currency board may critically depend on economic developments in neighbouring countries, as demonstrated by the experience of Argentina. Thus, virtuous behaviour is not a guarantee against crises.

Many observers argue that an appropriate remedy to all these deficiencies is a move toward an arrangement in which the national currency is allowed to fluctuate more or less freely (Eichengreen, 1999; Calvo and Reinhart, 2000). A floating exchange rate regime allows for a flexible adjustment to changing environment, including a change in the fundamentals and in relevant policies. Currency flexibility may work as a buffer against real shocks.

These are obvious advantages. After the East Asian crisis many emerging economies abandoned their pegs and moved to floating rate regimes, though almost always with active interventions. There are at least three reasons for a float to be less susceptible to crises than a fixed rate regime. First, under a float the exchange rate can adjust more quickly and smoothly to real shocks. This is because of nominal rigidity of domestic prices and wages. Under a fixed regime and with nominal rigidities, the adjustment to an adverse shock can only take form of a fall in output and employment. This is much more costly. Second, under a float domestic banks and firms have more incentives to hedge against the currency risk of the foreign borrowing and/or liabilities. In the south-east Asian crisis, the build-up of foreign debt owed a great deal to the expectation that the fixed peg would be maintained. Third, a float makes speculation more difficult because any speculator taking a long currency position has to find some other private sector agent to take the other side of the deal (Brash, 1999).

But the float does also involve some problems that cannot be dealt away easily. Under a flexible rate regime the burden of adjustment to external or policy-induced shocks rests almost entirely on the exchange rate level. The most important deficiency of such an arrangement is that the necessary adjustment may be very large, leading to very wide swings in the nominal exchange rate level. Under downward sticky prices this may lead to wide changes in real wages and profits, as well as to higher inflation (in case of downward adjustments). This potential for wide fluctuations of the nominal exchange rate is basically the result of high capital mobility and increases with the level of capital flows.

It should be noted that the share of foreign exchange transactions related to flows of goods and services in total transactions involving foreign exchange in more advanced transition countries has been diminishing in line with the growth of the size of the foreign exchange market. In Poland, the average amount of all transactions on the foreign exchange market is now between \$ 1.5 and 2 bn per day, but transactions related to payments for exports and imports of goods and services account only for \$ 120-170 mln, i.e. less than 10% of total flows. Moreover, an increasing proportion of capital transactions are conducted abroad, mainly in London, in form of currency swaps, futures and options, such as, e.g., Non-Deliverable-Forward transactions (NDFs). Only a small part of those transactions are linked to foreign direct investment - most reflect financial investments and hedging transactions. In sum, the developments on the foreign exchange market are to a large and still growing extent determined by financial capital flows.

Capital mobility under a flexible rate regime implies a large potential for massive swings in the exchange rate level. The result is higher uncertainty, more instability, lower investment and less trade. These effects will generally be more pronounced in small open economies, because in such economies the exchange rate determines prices of a higher proportion of goods and services produced.

There is, of course, an effective way to reduce the negative impact of the increased volatility of the exchange rate through universal including currency risk clauses in commercial contracts and providing simple currency risk insurance schemes. They would marginally increase transaction costs but the price is worth paying given the scope of potential disruptions produced by wild swings in exchange rates.

As with any choice, also the choice of an exchange regime should be weighted against its potential negative implications. A fixed exchange rate regime may be a preferred solution for a small open economy with a large share of trade in GDP and with a large share of one single foreign currency in total trade. If a fixed rate regime is chosen it should be as credible as possible to reduce incentives for speculation. This calls for a currency board, preferably using the euro as the currency of the peg. “Tying hands” of the monetary authority can, however, be painful in times of asymmetric shocks or when investors lose confidence in domestic policies.

A float may in turn be a preferred solution for less open and less internationally integrated economies that may be more susceptible to asymmetric shocks. Under such conditions, an independent monetary policy may help in cushioning the adverse impact of external and domestic shocks. An independent float is generally considered to be superior to a managed float because the absence of any explicit or implicit exchange rate target largely eliminates motives for speculation. But in the context of accession countries the independent float may in fact not be the best solution. These economies have still underdeveloped financial markets and occasionally experience large capital inflows under big privatisation transactions. Such transactions tend to destabilise the foreign exchange market as they produce wide swings in the nominal exchange rate that are not linked to changes in the macroeconomic fundamentals but rather reflect discrete decisions by the government and foreign corporations. In the standard Mundell-Flemming model, regular capital inflows attracted by interest rate disparity adjusted by a risk premium lead to real appreciation. Subsequent large and growing current account deficit would typically increase macroeconomic risk and at some point reverse capital flows. This in turn would produce currency depreciation necessary to restore current account balance.

This self-correcting mechanism gets blocked in a country that receives large capital inflows under privatisation transactions. The resulting appreciation tends to be excessive in the sense that when privatisation stops the downward adjustment of the exchange rate may be very large and sudden. This “boom-bust” exchange rate behavior can be called as the “Ikarus syndrome” (Rosati, 2000b). Under such circumstances it may therefore be reasonable to resort to occasional interventions that would absorb some of the privatisation inflows but without targeting any specific exchange rate level (a variant of a “dirty float” regime).

5.2. Is ERM-II Necessary as a Transitory Stage to Full EMU Membership?

ERM-II is a general exchange rate arrangement consisting of a fixed central parity against the euro, a pre-determined band of fluctuations up to +/- 15% around the parity, and the policy rule of automatic and unlimited intervention at the limits of the band, supported if necessary by short-term financing from the ECB. The ECB acting together with the national central

bank of an accession country can, however, suspend intervention if it would lead to higher inflation. Narrower bands can be declared unilaterally by a candidate country (ECOFIN, 2000).

ERM-II is considered as a test of stability for the currency of a candidate country. However, for countries that have been using a currency board for long time and have built up high credibility, a switch to ERM-II with its band of permitted fluctuations would actually introduce more instability and would mean a step backward. For countries that would decide to replace their national currency by the euro (unilateral “euroisation”), ERM-II would have even less sense, as it would involve a restoration of the national currency, only to again eliminate it several years later. Those countries should be allowed to move directly to the EMU, provided they fulfil all other requirements.

Poland has applied an independent float and joining ERM-II would certainly increase the risk of speculation. First, the central parity may not be selected properly as to reflect a medium-term equilibrium level. Second, putting a straight-jacket of a narrow band of fluctuations would encourage investors to test the resistance of the limits of the band, especially under conditions of massive capital inflows attracted by higher returns and prospects of EU membership. A standing commitment by the ECB to help the national central bank to defend the band may not be terribly effective in keeping away speculators, as the ECB may have different interpretation of the underlying causes of a speculative attack. If the turbulences are seen as caused by domestic policy imprudence rather than external shocks, the ECB would surely refrain from intervening.

In sum, ERM-II may be of limited use for Poland. A system that has been designed in early 1990s may not be suitable now, under conditions of greatly expanded capital mobility and for countries with much more integrated economies and financial systems. Given these new circumstances the EU could be well advised to apply more flexibility in interpreting the exchange rate obligations of the new members in light of the general provisions of the Maastricht Treaty, rather than insist on literal and rigid adherence to particular requirements.

5.3. Free Capital Mobility: A Blessing or a Curse?

Given all the problems in managing capital inflows it would be quite natural to reconsider the arguments in favour of full liberalisation of capital movements. It may be argued that a more practical and safer solution would be for some emerging economies to simply reduce the scope of capital mobility for certain categories of capital inflows. Economic theory and empirical evidence suggest that what is most important for ensuring rapid growth is currency convertibility on current transactions and opening up to FDI inflows. Free access to foreign credits is also helpful, provided banking sector regulation is efficient enough to monitor the process of external borrowing by domestic companies and banks. But early liberalization of other capital transactions, and especially of short-term financial flows may actually produce more harm than good.

Three options can be considered in this context. First, to suspend further liberalization of capital transactions in countries that have not yet opened up their capital accounts - or to

reintroduce some restrictions in more liberalized countries - until their financial sectors become more developed and their structural characteristics more substantially similar to those in industrialized countries (the EU). Second, to introduce temporary tax-based capital controls in form of mandatory reserves with the national bank on all short term capital movements. Both options involve some costs but they probably can help in preventing financial crises, provided other domestic policies are correct. The case of Chile is particularly telling. Mandatory reserves worked relatively well in the initial period, but with the passage of time their efficiency declined as investors were able to find ways to circumvent the formal controls and used more sophisticated financial instruments, including swaps and forward transactions. The unwanted side effects involved also efficiency losses resulting from the segmentation of the capital market and costs of administrative controls. The third option is to unilaterally replace the domestic currency by the euro (“euroisation”).

The first option is probably not open anymore for Poland. It would be politically very difficult to backtrack on capital liberalisation just few years before EU accession, especially if not all the necessary reforms of the financial system have been yet introduced. The second option can be used, as the Foreign Exchange Law from 1999 contains provisions allowing the National Bank of Poland to introduce mandatory reserves on short term capital inflows as emergency measures to protect balance of payments. The third option is discussed below.

5.4. Unilateral “Euroisation”?

The idea of the unilateral introduction of the euro in accession countries has been supported by several authors (Bratkowski and Rostowski, 1999; Mundell, 2000; Nuti, 2000). The authors have argued that accession countries, confronted with increasing capital inflows attracted by growing investment opportunities and prospects of EU membership, will be unable to simultaneously control inflation and avoid excessive appreciation. The level of real interest rates in those countries is likely to be higher than in the EU countries because of persistently higher inflation in the non-tradeable sector (the Balassa-Samuelson effect) and more attractive investment opportunities (relative scarcity of capital ensures higher returns on investment in those countries). If they adopt a fixed rate regime, capital inflows would require massive sterilised interventions that may go out of control. If they adopt a floating rate regime their tradeable sector would suffer from excessive appreciation which can seriously damage the competitiveness of these economies and eventually also lead to a currency crisis.

The solution to this dilemma is to unilaterally replace the national currency by the euro. This would result in lower inflation, lower interest rates, stable terms-of-trade and lower transaction costs. The “euroisation” would reduce uncertainty as it would eliminate the currency risk and risks of exchange rate fluctuations resulting from capital flows. The possibility of a speculation attack and a currency crisis would all but disappear on the account of the national currency being eliminated.

This proposal was met initially with a lot of criticism. It was argued that neither inflation would be much lower because of the presence of the Balassa-Samuelson effect, nor interest rates would fall that much because of still higher commercial and sovereign risk prevailing in

the accession countries. After all, a unilateral decision on the introduction of the euro would never be as credible as the multilateral decision, i.e. based on a formal membership in the EMU. A unilateral decision can always be unilaterally revoked. Also, gains from discontinued sterilisation could be more than offset by a loss of seigniorage revenue. The most fundamental critique, however, referred to high susceptibility of accession countries to asymmetric shocks that would significantly increase the cost of giving up monetary independence by those countries. In sum, the benefits would not be as large, and costs as low as Bratkowski and Rostowski suggested (Rosati, 1999).

The idea of unilateral “euroisation” has also met with strong opposition from the EU. The representatives of the EU Commission, ECOFIN, the ECB and some member countries (most notably Germany) argued that the introduction of the single currency should only be the final stage of a long and gradual adjustment process that will ensure nominal and real convergence between the accession countries and the EU member countries. Before the accession countries can join the euro area they are supposed to complete reforms of their financial and real sectors and raise income and wealth levels closer to the EU averages. No “short-cuts” must be accepted. Otherwise the financial and price stability of the EMU may be undermined (European Commission, 2000).

This critique to a large extent misses the point as it refers to membership in the EMU rather than to the unilateral introduction of the euro. These are two entirely different things. The unilateral decision by an accession country has nothing to do with membership in the EMU, neither gives it any decision rights in the ECB. The decision, if taken, is solely on the responsibility and risk of the accession country. Unilateral euroisation does not affect the requirement to obligatorily meet the nominal convergence criteria and as such cannot impair financial discipline in the euro area. To the contrary, it can actually strengthen the single currency as it would increase transaction demand for the euro.

With the passage of time also other risks connected with unilateral euroisation seem to be gradually diminishing. The scope for asymmetric shock in the most advanced accession countries is now limited, because of progress in integration through trade and investment (Buiters, Grafe, 2001; Rosati, 2001). As Poland advances with membership negotiations, the perspective for gaining EU membership in 2004 or 2005 becomes more realistic, reducing further commercial and sovereign risks and bringing down long-term interest rates. Under these circumstances the replacement of the national currency by the euro may indeed become a sensible solution. However, it is important to realise that even the euroisation will not eliminate the Balassa-Samuelson effect: under a single currency this effect will inevitably manifest itself through generally higher inflation in the accession countries than in the EMU countries.

ANNEX A

Chronology of Changes in the Regulatory Measures on Capital Mobility in Poland

CATEGORIES OF CAPITAL MOVEMENTS According to the OECD Code of Liberalization of Capital Movements	DATE OF LIBERALISATION
I. DIRECT INVESTMENT (according to the OECD/IMF benchmark definition, e.g. equity, credits and loans between the related companies, reinvested earnings) A. By non-residents in Poland B. By residents abroad	01.02.1996 22.03.1996 in the OECD countries and the countries, with which Poland concluded the investment protection treaties. In other countries the authorization by the NBP is necessary.
II. LIQUIDATION OF DIRECT INVESTMENT A. Abroad by residents B. In Poland by non-residents	01.02.1996 01.02.1996
III. OPERATIONS IN REAL ESTATE A. In Poland by non-residents B. Abroad by residents	RESTRICTED with few exceptions (non-residents are allowed to purchase apartments and up to 0.4 ha in rural areas without getting any permit, other investments need to be authorized by the Ministry of Interior) For business purposes – liberalized since 01.02.1996 For private purposes allowed up to euro 50 thousands since 01.02.1996. Exceptions for Polish diplomatic offices.
IV. OPERATIONS IN SECURITIES ON CAPITAL MARKETS A. Admission of domestic securities on a foreign capital market 1. Issue through placing or public sale 2. Introduction on a recognized foreign security market B. Admission of foreign securities on the domestic	Restricted until the beginning of 1997. 25% of the emission value of public traded companies liberalized after 4.02.1997, and 100% liberalised after 12.01.1999, with the exception of short-term securities. The residents were allowed to issue debt securities with the maturity longer than 1 year and to trade them since 1 April 1996. The restriction applies only to securities in public trading; issued on the Polish market (it should have ceased to apply by the end of 1999). Other securities may be introduced.

capital market	
1. Issue through placing or public sale	<p>As of 1 April 1996 non-residents were allowed to issue or sale in Poland debt securities which were approved by the Securities Commission, collective investment securities included up to ECU 200 mln and with maturity longer than 1 year. This ceiling was raised up to ECU 300 mln for 1997 and up to ECU 400 mln for 1998. The money transfers should be permitted by the NBP. Free under the new foreign exchange law since 01.1999 (the only restriction applies to mortgage debt bonds)</p>
2. Introduction on a recognized domestic security market	<p>Since 01.02.1996 the restriction concerned the debt securities not issued on the Polish market. The securities issued on the Polish market were treated as those described above.</p>
C. Operations in Poland by non-residents	
1. Purchase	<p>The restriction applied only to the purchase of shares and other securities of a participating nature, which may be affected by regulations on foreign direct investment.</p>
2. Sale	<p>Non-residents were allowed to sell on the Polish market the participation units in the collective investment funds and stock of the companies registered in the OECD countries and other countries with which Poland concluded bilateral investment protection treaties. The stock needed a prior permission for public trade issued by the Securities Commission. The ceilings for such trade were set up at ECU 200 mln as of 1 April 1996 and raised up to ECU 300 mln as of 4 February 1997 and to ECU 400 mln for 1998. Free under the new Foreign Exchange Law.</p>
D. Operations abroad by residents	
1. Purchase	<p>Since 01.02.1996 – partial liberalization – concerning securities from the OECD countries located enterprises, up to ECU 1 mln purchasing value and with maturity longer than 1 year. Further liberalization since 04.02.1997 lifting the value ceiling. Free under the new Foreign Exchange Law.</p>
2. Sale	<p>The sale of securities listed under C was free as of 01.02.1996</p>

<p>V. OPERATIONS ON MONEY MARKETS</p> <p>A. Admission of domestic securities and other instruments on a foreign money market</p> <ol style="list-style-type: none"> 1. Issue through placing or public sale 2. Introduction on a recognised foreign money market <p>B. Admission of foreign securities and other instruments on the domestic money market</p> <ol style="list-style-type: none"> 1. Issue through placing or public sale 2. Introduction on a recognised domestic money market <p>C. Operations in Poland by non-residents</p> <ol style="list-style-type: none"> 1. Purchase of money market securities 2. Sale of money market securities 3. Lending through other money market instruments 4. Borrowing through other money market instruments <p>D. Operations abroad by residents</p> <ol style="list-style-type: none"> 1. Purchase of money market securities 2. Sale of money market securities 3. Lending through other money market instruments 4. Borrowing through other money market instruments 	<p>RESTRICTED, but with the exemption of the authorised resident banks and if the Ministry of Finance allows non-residents to purchase state bonds (should be always mentioned in the prospect).</p> <p>Allowed for authorized resident banks only Allowed for authorized resident banks only</p> <p>Not allowed</p> <p>Liberalized (1999) Liberalized (1999) Allowed for authorized resident banks only</p> <p>Allowed for authorized resident banks only</p> <p>Allowed for authorized resident banks only</p> <p>Allowed for authorized resident banks only</p> <p>Allowed for authorized resident banks only</p>
<p>VI. OTHER OPERATIONS IN NEGOTIABLE INSTRUMENTS AND NON-SECURITISED CLAIMS</p> <p>A. Admission of domestic instruments and claims on a foreign financial market</p> <ol style="list-style-type: none"> 1. Issue through placing or public sale 2. Introduction on a recognised foreign financial market <p>B. Admission of foreign instruments and claims on a domestic financial market</p> <ol style="list-style-type: none"> 1. Issue through placing or public sale 2. Introduction on a recognised financial market <p>C. Operations in Poland by non-residents</p> <ol style="list-style-type: none"> 1. Purchase 2. Sale 3. Exchange for other assets <p>D. Operations abroad by residents</p> <ol style="list-style-type: none"> 1. Purchase 2. Sale 3. Exchange for other assets 	<p>RESTRICTED (where not mentioned otherwise)</p> <p>Free as of 12 January 1999 concerning the securities quoted on the Warsaw Stock Exchange, CTO and Polish Financial Exchange in Warsaw</p> <p>Allowed for authorized resident banks The residents are allowed to sell abroad non-securitised claims and negotiable instruments. Allowed for authorized resident banks</p>

<p>VII. OPERATIONS IN COLLECTIVE INVESTMENT SECURITIES</p> <p>A. Admission of domestic collective securities on a foreign securities market</p> <ol style="list-style-type: none"> 1. Issue through placing or public sale 2. Introduction on a recognised foreign securities market <p>B. Admission of foreign collective investment securities on the domestic securities market</p> <ol style="list-style-type: none"> 1. Issue through placing or public sale 2. Introduction on a recognised domestic securities market <p>C. Operations in Poland by non-residents:</p> <ol style="list-style-type: none"> 1. Purchase 2. Sale <p>D. Operations abroad by residents</p> <ol style="list-style-type: none"> 1. Purchase 2. Sale 3. Exchange for other assets abroad by residents 	<p>Free under the Law on Investment Funds and the New Foreign Exchange Law (1999)</p> <p>Free under the new Foreign Exchange Law (1999)</p> <p>Free under the new Foreign Exchange Law (1999)</p> <p>Free as of 4 February 1997</p>
<p>VIII. CREDITS DIRECTLY LINKED WITH INTERNATIONAL COMMERCIAL TRANSACTIONS OR WITH THE RENDERING OF INTERNATIONAL SERVICES</p> <p>In case where a resident participates in the underlying commercial or service transaction</p> <ol style="list-style-type: none"> A. Credits granted by non-residents to residents B. Credits granted by residents to non-residents <p>In cases where no resident participates in the underlying commercial or service transaction</p> <ol style="list-style-type: none"> A. Credits granted by non-residents to residents Credits granted by residents to non-residents 	<p>Liberalised since May 1, 1996</p>
<p>IX. FINANCIAL CREDITS AND LOANS</p> <p>A. Credits and loans granted by non-residents to residents</p> <p>B. Credits and loans granted by residents to non-residents</p>	<p>A and B liberalised since 01.04.1996 but for credits with maturity longer than 1 year only (as of 1 April 1996 shorter credits are allowed by authorized resident banks only)</p> <p>Restricted are the credits which result in debt in Polish currency, exceeding the equivalent of EURO 50.000 and whose maturity is shorter than one year</p>
<p>X. SURETIES, GUARANTEES AND FINANCIAL BACK-UP FACILITIES</p> <p>In cases directly related to international trade or international current invisible operations, or in cases related to international capital movement operations in which a resident participates.</p>	

<p>A. Sureties and guarantees:</p> <ol style="list-style-type: none"> 1. By non-residents in favour of residents 2. By residents in favour of non-residents <p>B. Financial back-up facilities:</p> <ol style="list-style-type: none"> 1. By non-residents in favour of residents 2. By residents in favour of non-residents <p>In cases not directly related to international trade, international current invisible operations or international capital movement operations or where no resident participates in the underlying international operation concerned</p> <p>A. Sureties and guarantees</p> <ol style="list-style-type: none"> 1. By non-residents in favour of residents 2. By residents in favour of non-residents <p>B. Financial back up facilities</p>	<p>Free as of 1 April 1996</p> <p>The residents were allowed to issue guarantees on credits and loans for non-residents since 1 January 1996 and on obligations concerning international trade and capital operations since 4 February 1997.</p> <p>Restricted</p> <p>Free under the new Foreign Exchange Law</p> <p>Restricted</p> <p>Allowed for authorized resident banks, only</p>
<p>XI. OPERATION OF DEPOSIT ACCOUNTS</p> <p>A. Operation by non-residents of accounts with resident institutions:</p> <ol style="list-style-type: none"> 1. In domestic currency 2. In foreign currency <p>B. Operation by residents of accounts with non-resident institutions</p> <ol style="list-style-type: none"> 1. In domestic currency 2. In foreign currency 	<p>Restricted for:</p> <ul style="list-style-type: none"> - The deposits exceeding 500.000 PLN and of maturity shorter than 3 month, - The exchange of Polish currency into the foreign ones if it originates from liquidating the long term deposits before 3 month from depositing them <p>No restrictions, but documented transfers only</p> <p>Restricted</p> <p>Restricted with some exceptions concerning: resident authorized banks, residents while abroad, representative offices of resident enterprises if the deposit is used to cover these offices' expenses, resident enterprises' branches abroad if the deposit is used to cover these branches operating costs, deposits made with authorised investment abroad</p>
<p>XII. OPERATIONS IN FOREIGN EXCHANGE</p> <p>A. In Poland by non-residents</p> <ol style="list-style-type: none"> 1. Purchase of domestic currency with foreign currency 2. Sale of domestic currency for foreign currency 	<p>Free as of 1 January 1990</p> <p>Free as of 01.01.1990</p> <p>There are restrictions on transfers of foreign exchange up to euro 5.000 in cash by individuals and up to euro 20 000 by the companies accompanied by the bank certificate for the non-resident carrying the cash abroad. The remaining transfers must be done via banks and connected with the underlying transactions. The forwards, swaps, hedging transactions are restricted. Authorized banks are allowed to do them.</p>

3. Exchange of foreign currencies	Free as of 1 January 1990
B. Abroad by residents	
1. Purchase of foreign currency with domestic currency	Free under the new Foreign Exchange Law (12.01.1999), the reservation applies to purchases not linked to any particular underlying transaction only.
2. Sale of foreign currency for domestic currency	Free under the new Foreign Exchange Law
3. Exchange of foreign currencies	Free as of 1 January 1990
XIII. LIFE ASSURANCE Capital transfers arising under life assurance contracts	Liberalised since 12.01.1999 by the new Foreign Exchange Act (art. 4 p.4)
A. Transfers of capital and annuities certain due to resident beneficiaries from non-resident insurers	
B. Transfers of capital and annuities certain due to non-resident beneficiaries from resident insurers	
XIV. PERSONAL CAPITAL MOVEMENTS	Liberalised since 27 March 1995
A. Loans	
B. Gifts and endowments	
C. Dowries	
D. Inheritances and legacies	
E. Settlement of debts in their country of origin by immigrants	
F. Emigrants' assets	
G. Gaming	
H. Savings on non-resident workers	
XV. PHYSICAL MOVEMENT OF CAPITAL ASSETS	
A. Securities and other documents of title to capital assets:	Free
1. Import	Resident had the right to export shares and other securities of a participating nature denominated in the Polish currency since 1 February 1996. Export of other securities was liberalized by the new Foreign Exchange Law
2. Export	
B. Means of payment:	
1. Import	Free
2. Export	Free
XVI. DISPOSAL OF NON-RESIDENT-OWNED BLOCKED FUNDS	Fully liberalized
A. Transfer of blocked funds	
B. Use of blocked funds in Poland	
1. For operations of a capital nature	
2. For current operations	
C. Cession of blocked funds between non-residents	

Source: Sadowska-Cieślak (2001).

ANNEX B

The Relationship Between the Real Exchange Rate, Current Account Balance in Poland, and Capital Inflows, 1995-1999.

The following simple regressions have been tested for two measures of the exchange rate with respect to current account balance (CA) and inflows of non-FDI capital (PIOC):

$$\text{RER} = a + b \text{ CA} + c \text{ PIOC} \quad (\text{A1})$$

$$\text{DEV} = d + e \text{ CA} + f \text{ PIOC} \quad (\text{A2})$$

where RER is the index of real exchange rate (PPI-deflated, January 1991=100), and DEV is the average monthly deviation of the nominal exchange rate from central parity. As the time series for RER, DEV and CA show high non-stationarity of order one and the Johansen test for cointegration has yielded ambiguous results, it was decided to use first differences for non-stationary variables. The estimation has been done for two periods: January 1996 – October 1999, and January 1997 – October 1999. The results obtained are shown in Table A1:

Table A1

Regression results on the relationship between exchange rate changes, current account balance and inflows of non-FDI capital

Period	Exchange rate variable	Constant	D(CA)	PIOC	R ²	F(stat)	DW	No of observ.
01/96-10/99	ΔRER	0.433 (2.92)	0.00013 (0.44)	-0.00078 (-3.48)	0.225	6.11	1.76	45
01/97-10/99	ΔRER	0.536 (2.62)	0.00014 (0.38)	-0.00088 (-3.01)	0.232	4.54	1.81	33
01/96-10/99	ΔDEV	0.569 (2.14)	-2.4E-06 (-0.05)	-0.00128 (-3.21)	0.196	5.13	1.67	45
01/97-10/99	ΔDEV	0.843 (2.32)	6.8E-05 (0.11)	-0.00168 (-3.23)	0.258	5.22	1.78	33

Source: Own calculations

The results for different specifications are quite similar. First, the tested relationship is statistically very weak and does not allow for any robust conclusion. Second, changes in the current account balance seem to have no impact on the (contemporaneous) changes in the exchange rate, real or nominal. Third, non-FDI capital inflows seem to be of some

importance, as suggested by t-statistics and coefficient signs, but the relationship may vary over time.

Equations (A1) and (A2) have next been tested for causality between the two measures of the exchange rate, current account balance and non-FDI capital inflows. Table A2 shows only the positive results of Granger causality test for various lags and various pairs of variables – i.e. only those pairwise cases for which the null hypothesis of no causality can be rejected at 10% confidence level. As can be seen, no clear causality can be detected between the exchange rate changes and the exogenous variables. In sum, neither current account balance nor non-FDI capital inflows seem to be primary responsible for the variations of the exchange rate in Poland in 1996-1999.

Table A2
Selected results for Granger causality test for RER, DEV, CA and PIOC.

Lags (months)	Null hypothesis	No. of observations	F(statistics)	Probability
2	RER does not cause CA	44	3.294	0.048
	CA does not cause RER		1.665	0.202
6	PIOC does not cause CA	40	2.405	0.054
	CA does not cause PIOC		1.215	0.329
9	PIOC does not cause CA	37	3.253	0.016
	CA does not cause PIOC		0.739	0.670
12	DEV does not cause CA	34	2.633	0.077
	CA does not cause DEV		1.760	0.201

Source: Own calculations.

ANNEX C

Stationarity of Deviations of the Exchange Rate from Central Parity

Daily observations of deviations of the “fixing” (central bank) exchange rate from central parity have been tested for stationarity with the Augmented Dickey-Fuller test. The results in Table B1 show that while for all years the deviation levels are not stationary, first differences are unambiguously stationary. This suggests a strong presence of systematic structural factors behind foreign exchange rate movements. It can also be seen that the role of the random walk factor gradually increases with time.

Table B1

ADF test results for stationarity of deviations of the “fixing” exchange rate from central parity, May 1995 – November 1999.

Year	No of daily Observations	Critical values		Critical values	
		Levels	1 st differences		
1995	153	-1.833	-4.378	1%:	-3.474
				5%:	-2.880
				10%:	-2.577
1996	245	-1.449	-7.899	1%:	-3.459
				5%:	-2.873
				10%:	-2.573
1997	246	-2.038	-8.407	1%:	-3.459
				5%:	-2.873
				10%:	-2.573
1998	250	-2.125	-6.693	1%:	-3.458
				5%:	-2.873
				10%:	-2.573
1999	225	-2.338	-7.382	1%:	-3.462
				5%:	-2.874
				10%:	-2.574

Source: Own calculations

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