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# Short-term rates of return on uncovered interest rate arbitrage and capital flows in Poland

**Abstract.** The paper aims to estimate the strength of influence of the expected rate of return and associated risk on directions and size of capital flows in Poland.

Estimated correlations indicate material conditions accompanying investment decisions of foreign investors. When deciding on a purchase of debt securities in the Polish market, they in reality analyse a relation of risk to yield, although they attach more importance to the risk inherent in an investment than to the potential rate of return.

Observation of such behaviour can be of high importance in the run-up to Poland's accession to the European Union. In the case of Poland's economic stability being maintained and widened, lower yields on Polish financial assets can still attract foreigners to invest in the Polish market. Stability of portfolio capital flows can be achieved not only by "funding" high rates of return to foreign portfolio investors but first of all by reducing the investment risk. A prerequisite for the latter is a credible economic policy that investors can put their trust in.

**Keywords:** foreign capital flows, foreign portfolio investment, uncovered interest rate arbitrage.

**JEL codes:** F31, F32, G11, G15.

## 1. Introduction

Foreign capital plays a major role in transition economies, nevertheless it can be associated with potential threats. An increasing foreign private capital inflow, particularly of short-term nature, raises a risk of destabilizing financial flows. It is a common assumption that portfolio capital is a "hot" capital moving across borders in search of expected extraordinary gains. This form of capital called speculative as well, is often considered to be less desirable. It is due to the fact that such capital flows are far less foreseeable and past financial crises have proved that it quickly flows out as soon as even minor disturbances in a country's economy occur. The

latest example of a sharp reaction of portfolio capital leading to a financial crisis was the Argentinian crisis.

The major factor that could affect the directions of capital flows is the economic policy pursued in a given country. The directions and amount of portfolio capital flows are interpreted as an investors' confidence index in the quality of stabilizing policy. A group of signals indicating an increased probability of sudden changes in directions of capital flows has been thoroughly discussed in the literature of the post Mexican peso crisis period[1]. The most important of these signals are: real exchange rate appreciation, increasing current account deficit, unsuitable official reserves, deterioration in terms of trade, excessive rise in domestic credit and private debt. Whenever such factors are observed, short-term and long-term foreign capital may be withdrawn. In that case investors are not willing to maintain local assets in their portfolios as they expect local currency to depreciate.

It is not only the perception of credibility of an economic policy that influences capital account balance. The other factor is the rate of return on portfolio investment and the risk arising from variability of returns. The evaluation of economic policy is reflected in interest rate changes in the financial market. An increase in credibility of a country's government policy among foreign portfolio investors reduces investment risk which in turn leads to a decrease in future realised rates of return (resulting from a decrease in interest rates) and their stabilisation (primarily as a result of lower exchange rate variability). On the other hand, high level of local interest rates relatively to those prevailing in the foreign investor's country may compensate for higher risk. Consequently, the foreign investors' expectations of potential rates of return provided at an accepted level of risk are a major determinant of directions of portfolio capital flows. A comparable interdependence may hold true for credits and deposits whose flows may be connected with expectations of profits provided at a given level of anticipated financial risk.

The paper aims to estimate the strength of influence of the expected rate of return and associated risk on directions and size of capital flows in Poland. The study is to determine empirical dependence of foreign capital flows on realised rates of return on uncovered interest rate arbitrage. The authors have examined the Polish balance of payments statistics concerning the scale and composition of capital flows. The statistical analysis is also based on market exchange rate quotations (USD/PLN and EUR/PLN) and interest rate quotations (WIBID 1M, LIBOR 1M for USD and EURIBOR 1M). The horizon of the study comprises the period of 1998-2002.

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[1]  See J. Sachs, A. Tornell, A. Velasco, *Financial crises in emerging markets: the lessons from 1995*, Brookings Papers on Economic Activity, Washington 1996.

## 2. Rates of return on portfolio investments in the Polish market in 1998–2002

Owing to the extensive size of this study, the authors have limited their discourse to an analysis of the impact of currency exchange rates volatility and interest rate differentials between domestic and foreign market on the profitability of foreign one-month portfolio investments in Poland. The traditional money market instruments have been mainly used (deposits and loans) for one-month investment periods offered, in the period under investigation, at LIBOR (EURIBOR) rates in the Eurodollar market and WIBID in the domestic market.

Considering the technical possibilities of the return rates account on investments in the domestic market (local) and the Eurodollar market, we can generally assume that they follow an investment strategy of opening the long Polish currency position. This involves taking a bank loan in eurocurrency (eurodollars or euro) in the European market, subsequently, purchasing of the Polish zloty (conversion of eurocurrencies into zloty) and finally, investing the financial resources in the Polish money market and reselling of the proceeds from the investment for eurocurrencies at a date of investment liquidation (maturity).

The estimation formula for the realized rate of return on uncovered interest rate arbitrage in the long zloty position (short position in euro or dollars) for one-month investment is as follows[2]:

$$r_t = \left[ S_{t-30} \left( 1 + i_{t-30}^{PLN} \cdot \frac{30}{365} \right) \frac{1}{S_t} \right] - \left[ 1 + i_{t-30}^{EW} \cdot \frac{30}{365} \right], \tag{1}$$

where:

$r_t$ – rate of return on the portfolio investment in $t$ time defined as the difference between the realized interest rate in the domestic market and the interest rate in the eurodollar market in $t$ period,

$S_{t-30}$ – price of dollars or euro in zlotys in the currency market in $t$-$30$ period,

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[2] In the account of return rates on standardised money market instruments (credits, loans, bank deposits, treasury bills) transaction costs have been excluded. In the experiment that enables the evaluation of the realized rates of return on short-term portfolio investments in the domestic money market the following assumptions have been made:

a) the account of profitability covers exclusively the liquid financial instrument investments with standard term of maturity – 30 days,

b) foreign investors take loans in US dollars or euro with interest rates of European interbank markets as of the date of investment (LIBOR 1M, EURIBOR 1M),

c) the exchange of eurodollars for zlotys and zlotys for eurodollars is made in congruence with the historical exchange rate quotations of the said currencies on the dates exactly relating to the dates of investment and its maturity (USD/PLN and EUR/PLN rates as per NBP fixing),

d) expected profits from the portfolio investments are calculated on the basis of the interest rates offered in the Warsaw interbank market as of the date of investment for standardized periods (WIBID 1M).

$S_t$ – price of dollars or euro in zlotys in the currency market in $t$ period,

$t$ – investment maturity date of the money market instruments,

$i_{t-30}^{PLN}$ – one-month interest rate on investments in the Polish interbank market (WIBID 1M) as of the investment date in the Polish market i.e. 30 days prior to investment maturity,

$i_{t-30}^{EW}$ – interest rate for one month loans denominated in US dollars in the London interbank market (LIBOR 1M) or an interest rate for interbank loans denominated in euro (EURIBOR 1M) on the investment date while contracting the obligation i.e. 30 days prior to investment maturity.

Positive values calculated with the above algorithm $r_t$ constitute the profit in per cent as a result of investing the loan capital, borrowed in the eurocurrency market, in liquid instruments in the domestic money market with maturity date ($t$). The negative values of $r_t$ constitute the loss in per cent as a result of investing loan capital, borrowed in the eurocurrency market, in the liquid instruments of the Polish market. Owing to the assumptions adopted for the account, the rates of return calculated for successive investment periods are not subject to transformation into effective interest rates.

The statistical trend showing the diversity of realized rates of return on one month foreign investments in the Polish market in the years 1998–2002 is shown on Figures 1 and 2.
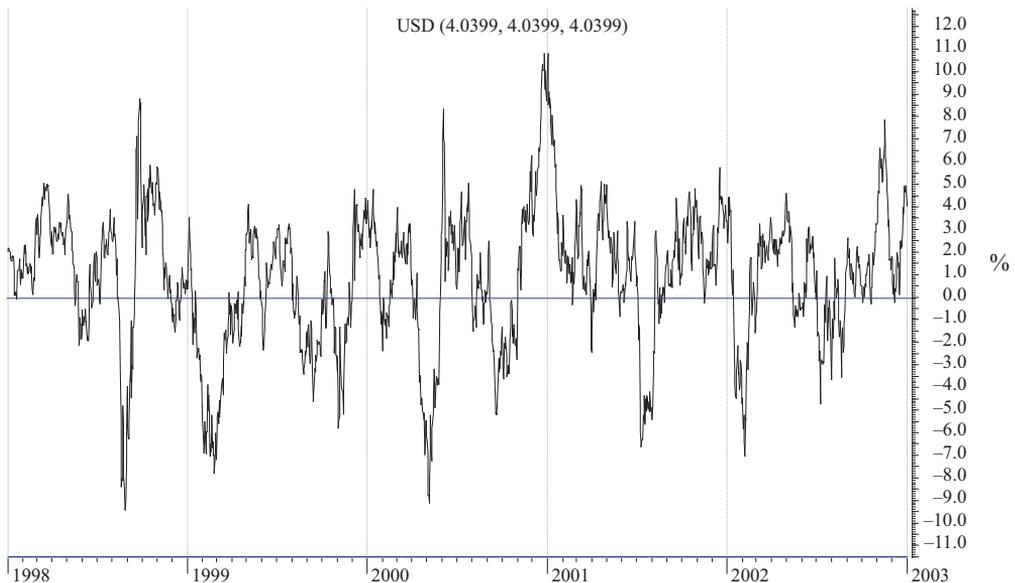


**Figure 1. Profitability of one month foreign investments: Polish zlotys vs. US dollars in the years 1998–2002. The chart shows realized rates of return in the short position in US dollars (eurodollar loan taken for investment in Polish zlotys). The proceeds from the investment are calculated in US dollars and are expressed in per cent**

EUR (0.0074, 0.0074, 0.0074)
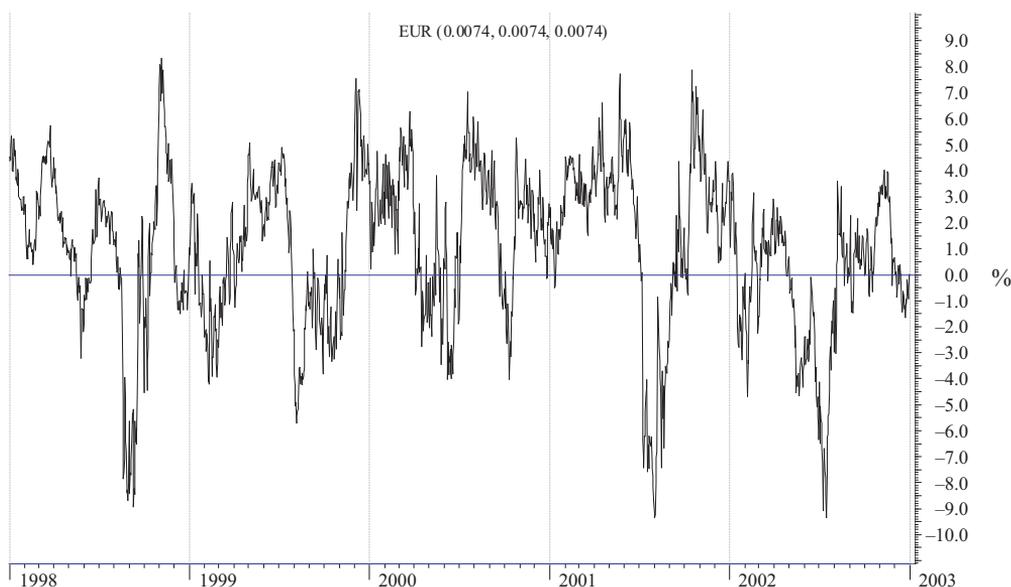
**Figure 2. Profitability of one month foreign investments: Polish zlotys vs. euro in the years 1998–2002. The chart shows realized rates of return in the short position in euro (euro loan taken for investment in Polish zlotys). The proceeds from the investment are calculated in euro and are expressed in per cent**

Positive values of realized rates of return indicate profitability of an investment strategy that involves borrowing eurodollars with a view to purchase short-term assets in Polish zlotys. That is clearly indicated by the trend curve rising above zero. Negative values of the realized rates of return indicate bad investments for foreign investors, which is shown by the trend curve falling below zero.

For example, the average 30 days rate of return for US dollars in the years 1998–2002 was 0,80%. This means that, on average, from each dollar, borrowed and invested in the liquid instruments for 30 days in the Polish money market the investors could gain 0.80 cents (disregarding bid-ask currency spread). For the euro the profit was 1,01%. The high risk which accompanies the operations of uncovered interest rate arbitrage is also worth mentioning. It was shown in high unanticipated volatility of realized rates of return, specified in the above Figures. The risk of such operations measured by a standard deviation for the US dollars was 2,86%, and for the euro 3,06%. The absolute differences between the interest rates of 30-day instruments of the Polish money market and those of the eurodollar market, which included the exchange rate fluctuation were oscillating from –9,44% to 10,79% for the US dollars and, for the euro, from –9,35% do 8,33%. The worst year for foreign investors was 1999 when, on average, the interest rates fell to –0,71% for theUS dollars at a standard deviation of 2,83% for the US dollars; for the euro the year

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2002 when the rate of return amounted to –0,37% at a standard deviation of 2,59%. Negative rates of return resulted from strong depreciation of the zloty against the USD in 1999 and the EUR in 2002 that far exceeded differentials in eurocurrency and PLN interest rates.

Detailed results of the analysis of the rates of return on foreign investments in the long position in the Polish zlotys and short position in the USD and the EUR at one month investment periods are shown in Table 1.

**Table 1. Statistical analysis of rates of return on foreign investments by eurocurrency investors in the years 1998–2002 (short position in EUR or USD and long position in PLN)**

| LONG PLN/SHORT EUR | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Average rate of return in % | 1,10 | 0,71 | 1,86 | 1,75 | –0,37 |
| Standard deviation in % | 3,22 | 2,84 | 2,42 | 3,56 | 2,59 |
| LONG PLN/SHORT USD | | | | | |
| Average rate of return in % | 1,43 | –0,71 | 0,75 | 1,64 | 0,89 |
| Standard deviation in % | 2,86 | 2,83 | 3,59 | 2,77 | 2,48 |

# 3. Foreign investment in Poland in the years 1998–2002

Foreign direct investment in Poland in the years 1998–2002 amounted to 31 billion USD[3]. It is worth mentioning that the inflow of direct investment experienced a progressive increase in the years 1989–2000. However, this inflow of capital was down in 2001 and 2002 compared to the previous years, which was mainly due to unfavourable tendencies in the Polish and world economy. As regards the Polish economy, the main factor behind the fall in inward direct investment was a deceleration in the privatisation process. The smaller influx of capital stemmed also from a general slowdown in the Polish economy as GDP growth diminished.

Polish investment abroad is of relatively small importance. Resident investment abroad totalled 804 million USD in the analysed period, i.e. in the years 1998–2002. Such huge asymmetry in resident and non-resident investment results from a limited stock of capital in Poland.

According to the balance of payments statistics, the foreign portfolio investment[4] in Poland amounted to 9,8 billion USD, of which investment in debt securities came

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[3]   The main source of information on capital flows in Poland is the balance of payments statistics prepared by the National Bank of Poland: www.nbp.pl.

[4]   Portfolio investment comprises payments on the purchase and sale of financial assets not constituting direct investment: equity securities and debt securities.

**Table 2. Non-resident direct investment in Poland and resident direct investment abroad in the years 1998–2002 (a minus sign signifies a financial outflow from Poland)**

| | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Non-resident direct investment in Poland (USD million) | 5130 | 6474 | 8293 | 6995 | 4119 |
| Resident direct investment abroad (USD million) | −161 | −122 | −124 | −67 | −330 |

to 8 billion USD and investment in equity securities totalled 1,8 billion USD. In the period under examination, foreign investors definitely preferred purchasing debt securities. Inward investment in debt securities in the years 1998–2002 resulted from various domestic and external factors. The major domestic factors that influenced investment climate in the financial market in Poland were[5]:

- macroeconomic tendencies in Poland, such as changes in the ratio of the current account deficit to GDP, the inflation rate and the real exchange rate;
- directions of economic policy, particularly the interest rate cuts carried out by the NBP as regards the monetary policy, and the high government deficit financed by new issues of the Treasury securities in the domestic and foreign markets as regards the fiscal policy;
- expected accession to the European Union and anticipated acceleration of the convergence process of the Polish economy, interest rates and the exchange rate stabilization prior to joining the European Monetary Union.

In addition, the scale and directions of portfolio capital flows in the debt securities market were influenced by tendencies in the international markets, such as a significant slide of real interest rates in the developed countries resulting from the economic slowdown.

Table 3 shows the size of foreign portfolio investment in the years 1998–2002. The inflow of foreign capital can be clearly observed in each of the analysed years.

**Table 3. Foreign portfolio investment in Poland in the years 1998–2002**

| | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Foreign portfolio investment in debt securities in Poland (USD million) | 873 | 532 | 1810 | 1372 | 3369 |
| Foreign portfolio investment in equity securities in Poland (USD million) | 951 | 882 | 866 | −306 | −545 |

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[5] See more on the subject in annual reports of the Foreign Trade Research Institute „Foreign investment in Poland".

It totalled 7956 million USD in the five year period under examination, and it came to 3369 million USD only in 2002. On the other hand, portfolio inward investment in equities stood at 2,7 billion USD in the years 1998–2000, but there was an outflow of capital amounting to 851 million USD in the next two years. Directions of foreign capital flows in the equity market were correlated with tendencies on the Warsaw Stock Exchange. The Polish bourse experienced an upward trend from October 1998 to March 2000, but afterwards the situation changed and share prices continued their downward trend.

At the same time, resident portfolio investment abroad stood at approximately 1,9 billion USD, of which 70% as debt securities. The structure and amount of capital outflows presented in Table 4 resulted from prevailing interest rate differentials in the Polish and the world market (as far as debt securities are concerned) and an ongoing liberalisation of capital flows (enabling Polish residents to invest in foreign shares).

**Table 4. Polish resident portfolio investment abroad in the years 1998–2002 (a minus sign signifies a financial outflow from Poland)**

|  | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Resident portfolio investment in debt securities abroad (USD million) | –89 | –375 | –64 | 110 | –886 |
| Resident portfolio investment in equity securities abroad (USD million) | –41 | –172 | –21 | –67 | –267 |

Another position in the capital and financial account of the balance of payments is 'Other investment' that comprises mainly credits and deposits. The period 1998–2002 saw a net outflow of 1 billion USD stemming from an increase of 2,8 billion USD in the Polish liabilities to foreign parties (mostly as a result of drawings of long-term credits) and a rise of 3,9 billion USD in the Polish assets abroad (mostly concerning accounts receivable of the banking sector). This net capital outflow resulted especially from capital flows in 2001 and 2002 when foreign credit repayments of 2,5 billion USD were made. Another factor was a high volatility of resident holdings of deposits at foreign banks.

The balance arising on settlements involving financial derivative transactions between residents and non-residents came to a negative 745 million USD in the years 1998–2002. The negative balance may be interpreted as the net loss incurred by residents on settling derivatives positions, adjusted for flows arising from the opening of derivatives positions and settlements on them[6].

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[6] See Balance of payments of the Republic of Poland 2002, NBP, Warsaw 2003, p. 36.

**Table 5. Foreign loans received and deposits in the years 1998–2002 (a minus sign signifies a financial outflow from Poland)**

|  | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Loans received, maturing in over 1 year (USD million) | 1669 | 2057 | 1250 | −1567 | −973 |
| Loans received, maturing in up to 1 year (USD million) | −43 | 441 | 143 | −91 | 448 |
| Currency and deposits (USD million) | −41 | −172 | −21 | −67 | −267 |

**Table 6. Loans extended to foreign parties and deposits abroad in the years 1998–2002 (a minus sign signifies a financial outflow from Poland)**

|  | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Loans extended, maturing in over 1 year (USD million) | −88 | −9 | 126 | −21 | −71 |
| Loans extended, maturing in up to 1 year (USD million) | −14 | 11 | 26 | 16 | 16 |
| Currency and deposits (USD million) | 2270 | −2700 | −3072 | −3495 | 3147 |

**Table 7. Financial derivatives, net in the years 1998–2002 (a minus sign signifies a financial outflow from Poland)**

|  | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|
| Financial derivatives, net (USD million) | −362 | 571 | 267 | −341 | −880 |

# 4. Directions, level of capital flows and realised rates of return on foreign investments in Poland

Do the directions and amount of capital flows depend on rates of return realised by foreign investors? According to common knowledge investment decisions should be based on the rules of effectiveness account. These rules state that the criterion of maximising the rate of return in a given class of risk or minimising the risk in a given class of return rate should be implemented. Were capital flows, thus, determined by the expected rates of return resulting from the Polish and the international interest rates and exchange rates fluctuations in relation to the accompanying risk?

An answer to this question has a special meaning in the period of foreign investment liberalisation. It concerns mainly the portfolio capital that may destabilise the foreign exchange market and hence the whole economy as it reacts quickly to

changes in an economic environment. Consequently "hot" foreign capital flows have to be under scrutiny.

In order to investigate the strength of relationship between short term rates of return and capital flows, average one month rates of return on uncovered interest rate arbitrage in short EUR or USD position and their risk in the period 1998-2002 have been calculated. Furthermore, correlation coefficients of these return rates on portfolio investment and of the accompanying ones with monthly portfolio capital flows have been estimated.

In line with the expectations, only rather weak relationship between the volume of capital inflow and the level of return rates and their risk in the domestic debt securities market could be observed. Statistical investigation has proved that foreign investors were not afraid of a possible depreciation of the overvalued Polish zloty that could potentially exceed interest rate differentials. They therefore carried out uncovered interest arbitrage taking up short positions in eurocurrencies and long positions in the zloty. The correlation coefficient for the relationship between the US dollar rates of return and the inward portfolio investment was +0,19. The correlation between the risk measured as standard deviation of arbitrage rates of return and capital influx in the debt securities markets turned out to be negative. The coefficient amounted to –0,16 for short positions opened in the USD.

The measure of association of the relationship between the rates of return and the capital inflow reached +0,02 for the investors taking short positions in the EUR. A stronger linear relationship was observed between the risk of return and inflow of investment, as the coefficient was –0,30.

Monthly capital flows in other positions of the capital and financial account proved not be correlated with the realised one month return rates of foreign investors[7].

The results of empirical test for aggregated positions of the capital and financial account are presented in Table 9. Based on these data, one could draw a general conclusion that the realised rates of return on uncovered interest rate arbitrage in the period under examination had only a minor influence on directions and scale of foreign direct investment inflow. Returns on foreign direct investment were mainly connected with an economic activity, rather than with a speculative activity. As a result, the size and directions of inward direct investment depended on expectations of the future economic situation in Poland. In turn, tendencies in an economy are to some extent determined both by long-term interest rates and future foreign exchange rates.

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[7]   For credit flows minor correlation (below 0,1) of monthly rates of return on uncovered interest rate arbitrage (opening eurocurrency short position by foreign investors) with directions and volume of these flows was detected. The coefficient of relationship between credit flows and standard deviation of return rates on short position in EUR and USD was negative and stood at –0,1 and –0,2 respectively.

**Table 8. Coefficients of correlation between directions and size of aggregated capital flow positions in the capital and financial account of the Poland's balance of payments with monthly return rates on short positions in EUR or USD of foreign investors and with risk of return rates in the years 1998–2002. Source: the authors' calculations**
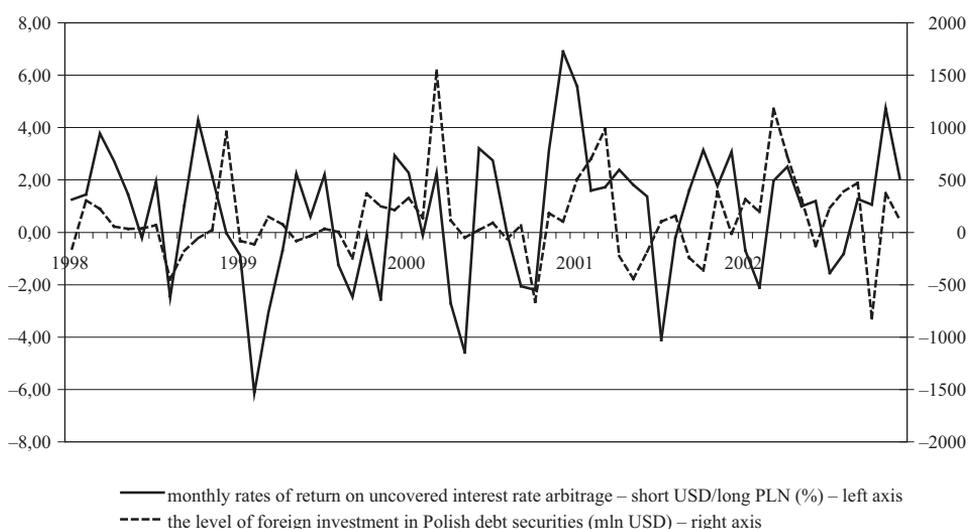
|  | Direct investment (balance) | Portfolio investment (balance) | Other investment (balance) – loans and deposits | Derivatives (balance) |
|---|---|---|---|---|
| Rate of return (short position in EUR) | 0,06 | **0,14** | 0 | 0,15 |
| Risk (short position in EUR) | 0,07 | **–0,35** | 0,08 | –0,03 |
| Rate of return (short position in USD) | –0,09 | **0,22** | –0,03 | –0,03 |
| Risk (short position in USD) | –0,06 | **–0,14** | –0,08 | –0,14 |

Similarly, no material influence of rate of return on uncovered arbitrage on capital flows arising on settlements involving financial derivative transactions could be observed. There is a logic in it as foreign and domestic investors may open both short and long positions in the derivatives market incurring losses or making profits from an increase or a fall in interest rates and/or foreign exchange rates.

However, one can wonder about no material correlation between short-term rates of return on financial transactions in, simultaneously, the short eurocurrency position and long zloty position with the level of monthly credit flows. The NBP restrictive monetary policy of maintaining high official interest rates resulted after all in a large disparity between the level of domestic and foreign interest rates and the exchange rates of domestic and foreign currencies. Although real interest rates in Poland were much higher as compared to international financial markets, the real depreciation of the zloty did not compensate for prevailing interest rate differentials. Exchange rates advantageous to domestic debtors and relatively small breadth and depth of the Polish financial market posed an incentive to draw loans abroad. The absence of correlation between short-term return rates on uncovered interest rate arbitrage with credit operations was also a result of the term structure of liabilities denominated in foreign currencies. When analysing Poland's international investment position one can see that most loans drawn were of long-term maturity, except for trade credits. Such a situation (larger share of loans with maturity over one year) could be to a certain extent attributed to regulations of the "Foreign Exchange Act" of December 18, 1998[8] valid until September 30, 2002.

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[8]  The "Foreign Exchange Act" of December 18, 1998 (as published in the Journal of Laws of 2002 no. 72, item 665, with further amendments). Art. 9, subpara. 4 stated a restriction. According to the law the foreign exchange permit was required for credit dealings resulting in the appearance of a

In the period under investigation a significant rise in non-resident portfolio investment in debt securities could be observed. The demand for the Polish securities stemmed mainly from favourable interest rates and appreciation of the Polish currency in the foreign exchange market. Interest rates maintained at the high level as compared to interest rates abroad in the situation of sustaining overvaluation of the zloty attracted especially foreign portfolio investors. However, shifts in capital flows (sudden outflows) were experienced as well. This was as result of uncertainty regarding the economic policy in Poland, particularly in periods of abrupt depreciation of the Polish zloty, new large supplies of Treasury securities or debt securities repurchase transactions carried out by the Treasury.



monthly rates of return on uncovered interest rate arbitrage – short USD/long PLN (%) – left axis
---- the level of foreign investment in Polish debt securities (mln USD) – right axis
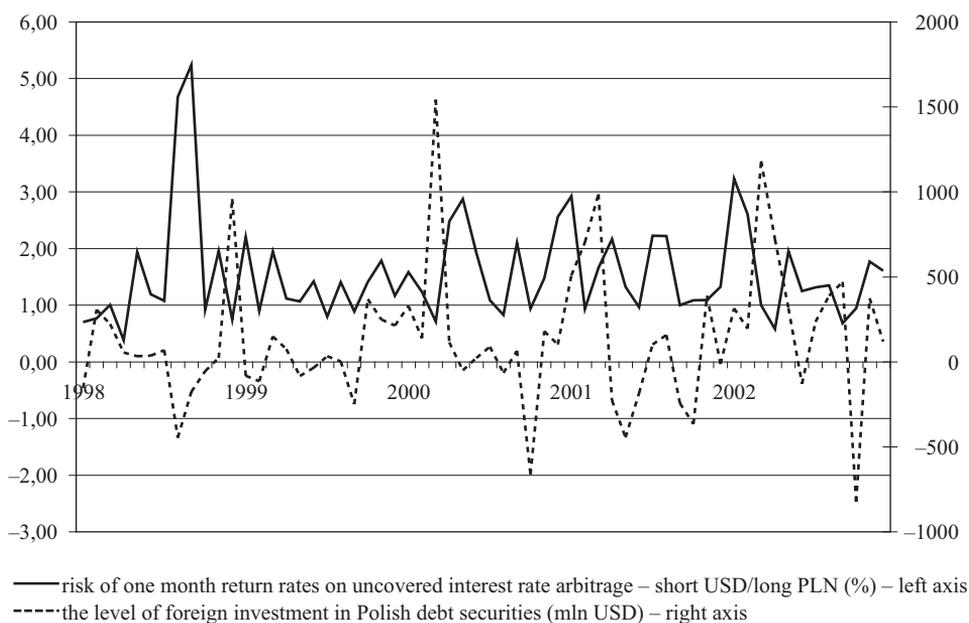
**Figure 3. Monthly rates of return on uncovered interest rate arbitrage involving opening short position in USD and long position in PLN in comparison to the level of foreign investment in Polish debt securities**

The appearance of positive correlation between the rates of return on uncovered interest rate arbitrage of foreign investors and the directions and volume of portfolio inward investment in the debt securities markets in the years 1998–2002 (Figure 3) confirms general dependence of capital flows in the debt securities sector on the profitability of investment in Polish debt securities. The attractiveness of

debt whose time limit for repayment was shorter than one year. The repayment moment was understood as a moment of the one-off repayment of the whole debt or a moment of the repayment of the first instalment of a loan. For this reason, in practice the act restricted not only short-term loans and credits but also long-term loans and credits. Only a loan or credit agreements with first instalment postponed at least one year forward were not subject to the obligatory permit.

the above-mentioned investment increased as a result of a rise in the interest rate disparity and convictions that the foreign exchange market was able to keep the value of the zloty unchanged. This can explain the relationship between the rates of return and the foreign capital flows; it was being reduced when the risk of purchasing Polish portfolio assets was increasing. That is why the negative relationship between the risk of return rates (as measured by standard deviation) and portfolio capital flows in the Polish debt securities markets (Figure 4) could be observed. It proves that foreign investors take into consideration not only the level of the rate of return but they also evaluate it in relation to the risk. The statistical research saw the highest correlation coefficients in the relationship of risk (measured by standard deviation) of return rates on uncovered interest rate arbitrage with directions and size of portfolio capital flows in the Polish debt securities market. At the same time, the measure of association of relationship between the return rates and the portfolio capital flows in the debt securities sector turned out to be lower, which can prove a strong risk aversion of foreign portfolio investment.



——— risk of one month return rates on uncovered interest rate arbitrage – short USD/long PLN (%) – left axis
----- the level of foreign investment in Polish debt securities (mln USD) – right axis

**Figure 4. Risk of one month return rates on uncovered interest rate arbitrage involving opening short position in USD and long position in PLN in comparison to the level of foreign investment in Polish debt securities**

The correlation examined was rather weak. This can be interpreted that not only the expected rates of return and the risk associated with portfolio investment determine directions and level of flows. A less significant role of the return rate criterion

when making investment decision resulted form the fact that foreign investors purchased mainly the Treasury securities. High state budget deficit made it necessary for the government to place new debt securities issues in the market. In turn, high risk premium on such investment had to be offered to foreign investors in order to attract them. Relatively high interest rates lured foreign capital needed to finance state budget demands but securities issues of the Treasury Ministry were correlated much more with state budget needs than with return rates of foreign investors.

The decrease in correlation coefficient for return rates of foreign investors with the directions and scale of portfolio capital flow in the debt securities market stemmed also from the fact that the debt securities issues denominated in other currencies than the zloty are included in the account of capital flows. These issues offered to foreign investors mainly by the Treasury made it possible to refinance foreign debt repayments. The supply of the Polish debt securities in foreign markets weakened the statistical relationship between the directions and level of capital flows and the return rates on uncovered interest rate arbitrage conducted by foreign investors. The size of foreign issues was also dependent more on demands of the Treasury than on the level of return rates on uncovered arbitrage as the issues of these securities were denominated for the most part in EUR and USD. It is worth mentioning that changes in return rates on uncovered arbitrage for sure influenced the level of the investment risk premium that was higher than profitability of similar foreign financial instruments. The level of the risk premium in foreign currencies was closely matched to the risk of investing in a given country which in turn was reflected in the premium offered in exchange for risk in trading of domestic debt securities (denominated in the zloty). When analysing capital flows resulting from securities issues of the private sector, one should bear in mind that these were concentrated in a few large companies[9].

Legal restrictions were the other factor that dissolved the statistical strength of relationship between short-term rates of return on uncovered interest rate arbitrage and monthly capital flows. According to Art. 9, subpara. 3 of the above-mentioned Foreign Exchange Act of 1998, investment portfolio in short-term securities required the foreign exchange permit[10]. This restriction concerned purchase transactions of short-term securities carried out by residents and foreign investors, except for operations of the Treasury.

Last but not least, the relatively weak statistical relationship stemmed also from imperfections of the Polish securities market. They were relatively frequently re-

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[9] What is more, most of the debt securities offered to foreign investors were denominated in foreign currencies e.g. TP S.A. (1,5 billion EUR in the years 1999-2001 and 1 billion USD in 1998), power plant Elektrownia Turów (270 million EUR in 2001), PGNiG (800 million EUR in 2001), Kredyt Bank S.A. (150 million EUR in 2001), BRE Bank S.A. (124,7 million EUR in 2001), Bank Handlowy S.A. (200 million USD in 1997) and LOT (100 million USD in 1998).

[10] Understood generally as bonds and other debt securities (e.g. bills of exchange) with the maturity shorter than one year.

flected in the herd instinct behaviour (as compared to the developed markets). As a result investors demonstrated often the bandwagon effect and did not base their investment decisions on a rational financial analysis.

## 5. Final remarks

The estimated correlations indicate material conditions accompanying investment decisions of foreign investors. When deciding on a purchase of debt securities in the Polish market, they in reality analyse a relation of risk to yield, although they attach more importance to the risk inherent in an investment than to the potential rate of return. Observation of such behaviour can be of high importance in the run-up to Poland's accession to the European Union.

The more rapid decrease in yields of Polish debt securities as compared to similar foreign debt securities (resulting from the convergence process within the European integration) does not necessarily need to make foreign investors lose their interest in securities denominated in zlotys. In the case of Poland's economic stability being maintained and widened, lower yields on Polish financial assets can still attract foreigners to invest in the Polish market. Stability of portfolio capital flows can be achieved not only by "funding" high rates of return to foreign portfolio investors but first of all by reducing the investment risk[11]. A prerequisite for the latter is a credible economic policy that investors can put their trust in.

It is worth taking into consideration these changes in the "Foreign Exchange Act" which introduce liberalisation of capital and payments flows (the regulations came into force in October 2002). In the light of the analysed relationship, the most significant modification is that foreign exchange restrictions regarding residents, e.g. Polish companies, within the scope of short-term credits and loans drawn in the member countries of the European Union have been raised[12]. The other important amendment enables to sell securities of investors from the EU countries[13.] Lifting

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[11] The main threat posed to foreign portfolio investors in the debt securities market are foreign exchange rate fluctuations that depend to a large extent on the market participants' expectations, consciousness and evaluation of risk.

[12] According to Art. 9, subpara. 10 of the "Foreign Exchange Act" of July 27, 2002 (as published in the Journal of Laws no. 141, item 1178) following foreign exchange dealings are subject to restrictions: drawings of credits and loans by resident from non-residents having their place of residence or their seat in third countries (these are other countries than the Republic of Poland not being members of the European union according to Art.2, subpar.1, indent 5) when time limit for repayment is shorter than one year for at least half of loan or credit principal.

[13] According to Art. 9, subpara. 6 of the "Foreign Exchange Act" of July 27, 2002 ("The Journal of Laws", No. 141, item 1178) e.g. following foreign exchange dealings are subject to restriction: purchasing of securities, debt and other rights whose enforcement involves cash settlements by non-residents having their place of residence or their seat outside the European Union.