REPORT ON PURCHASING POWER PARITY AND UNCOVERED INTEREST PARITY  
CASE STUDY: US DOLLAR vs. POLISH ZLOTY/SWISS FRANC  

Adrian Petre
Bucharest University of Economic Studies,
6 Romana Square, 1st district, Bucharest, 010374 Romania
ec_adrian.petre@yahoo.ro

ABSTRACT
As requested, I have prepared a report which aims to discover the relationship between exchange rates changes, inflation rate differentials and interest rate differentials in the PPP and UIP frameworks. In terms of currencies, the study analyses the US dollar, which is assumed to be the reference currency, versus an emerging market currency (the Polish zloty) and a developed market currency (the Swiss franc). In contrast with many studies, which have used short-horizon interest rates, I test UIP using interest rates on 10-year maturity bonds for the three countries because many scientific articles demonstrate it is more sustainable to compute and analyze long-term interest rates than short term interest rates. I find that PPP roughly holds over the period, while the UIP is strongly rejected. However, interest rates provide some explanation for the evolution of exchange rates and my model can be improved either qualitatively, by employing other techniques such as multiple regressions, stationarized data, GARCH models, etc. Or quantitatively, by adding other relevant factors that influence the movements in the exchange rates (e.g. trade balance, monetary policy, etc.).

Indexing terms/Keywords  
purchasing power parity; financial markets; uncovered interest parity

Academic Discipline And Sub-Disciplines  
Economics

SUBJECT CLASSIFICATION
Economic Subject Classification

TYPE (METHOD/APPROACH)
Literary Analysis; Econometric Analysis

INTRODUCTION
For open economies, the concepts of Purchasing Power Parity (PPP) and interest rate parity are two important components of the macroeconomic analysis and among the basic models used in international finance.

PPP hypothesis postulates a proportional relationship between a nominal exchange rate and relative price levels. PPP is the common assumption that the amount of US dollars needed to purchase a specified basket of goods should be equal to the other currencies taken into consideration that are needed to buy the same basket of goods. If the long-run PPP relationship exists, any short-run deviations, such as depreciation of a currency, will transmit to the change of inflation. This adjusts and equilibrates the trade flows and as a result, it tends to return the exchange rate level. PPP theory also provides some implications such as serve as a prediction model for exchange rates as well as a benchmark for judging the movements of exchange rates since it relates to undervaluation or overvaluation of a country’s currency.

Interest rate parity has been developed in two forms, known as Covered Interest Parity (CIP) and Uncovered Interest Parity (UIP) or international Fisher effect. Both forms of interest parity study simple relationships between interest rates and foreign exchange market prices, as spot or forward exchange rates. Under the UIP condition, the currency associated with the economy with a higher interest rate is expected to depreciate relative to the currency of the country with a lower interest rate.

Based on the Purchasing Power Parity theory (PPP), the Uncovered Interest Parity, and previous studies reviewed above, I hypothesize that inflation rate differentials and interest rate differentials have positive significant influence on the changes in the exchange rate.

The rest of the paper is structured in 5 sections. Section 2 reviews relevant literature on PPP and UIP and highlights some of the empirical findings of other similar studies. Section 3 discusses the research methodology and data used for the study. Section 4 presents and explains the regression results and other ways to test the PPP and UIP theories, while section 5 suggests and explains improvements to the empirical analysis that might lead to better results. The report ends with a chapter of conclusions.
LITERATURE REVIEW

The empirical evidence for either PPP or UIP individually is mixed at best. In all the cases PPP and UIP were tested under the assumption that participants in the foreign exchange markets form rational expectations. I found that UIP does not hold on a short horizon of time and that exchange rates are not entirely explained by the evolution of the differential interest rate and of the differential inflation rate. Other factors such as: openness, size, extant, government debt, output growth, terms of trade movements, degree of central bank independence should also be taken into consideration for accurate predictions. I also considered that it is more sustainable to compute and analyze long-term interest rates than short term interest rates.

My findings are developed in many academic papers in articles. I have chosen the most relevant studies for my report.

Philip R. Lane (1999) analyses long-run movements in exchange rates across countries. He shows that unmodified purchasing power parity (PPP) is not an optimal model of the long-run nominal exchange rate.

A positive relationship between relative price levels and relative income levels has been recognized by Balassa (1964), Samuelson (1964), Kravis and Lipsey (1983). The Balassa-Samuelson hypothesis implies that long-run movement in the real exchange rate is driven largely by differential productivity growth in the traded and non traded sectors. Bhagwati (1984) states that a rising capital-labour ratio changes the product mix in the traded sector towards more capital-intensive goods, raising economy-wide wages and the relative price of non-traded goods. Bergstrand (1991) shows that non-homothetic preferences that generate an income elasticity of demand greater than one for non-tradable goods can also help to explain the positive dependence of the price level on income. For this reason an improvement in a country’s terms of trade mechanically leads to an appreciation in its real exchange rate if there is home bias in the consumption of tradables.

Another theory tested in my paper refers to the uncovered interest parity. Annika Alexius (2001) explains that in countries with high nominal interest rate experience appreciations of their currencies cannot be predicted using uncovered interest parity, if the data analyzed is on short-term.

Most empirical findings reveal that the relationship between short interest rates and exchange rates is different from the relationship between long interest rates and exchange rates. The negative relationship between short interest rates and exchange rates can be a consequence of a particularly monetary policy. Also nominal exchange movements are difficult to predict for short periods of time, while the presumed existence of long-run equilibrium real exchange rates are more likely to conduct to some accurate predictions regarding the long-run movements of nominal exchange rates.

DATA AND RESEARCH METHODOLOGY

I use two currencies, of which one is an emerging market currency (the Polish zloty) and one is a developed market currency (the Swiss franc) and their relationship to the US dollar. The US dollar is seen as a global currency, because it is used in a vast majority of international transactions and it serves as the world’s primary reserve currency.

The Swiss franc has historically been considered a safe-haven currency and it has floated independently until its currency appreciation became unsustainable during the Euro zone debt crisis.

On the other hand, the Polish zloty is preparing to be included in the ERM II (European Exchange Rate Mechanism) in 2004, which means that it is based on the concept of fixed currency exchange rate margins with the euro, but with exchange rates variable within those margins.

The monthly exchange rates are provided by OANDA, a trusted source for currency data that has access to one of the world’s largest historical, high frequency, filtered currency databases. The monthly inflation rates are reported by inflation.eu, which compiles the inflation data from Eurostat and the long term interest rates (10-year bond rates) are taken from the OECD database.

The monthly changes in the exchange rates, the differentials in inflation rates and the differentials in interest rates were computed using the following formulas:

\[
\text{Monthly change in exchange rate} = \frac{S_{t_2} - S_{t_1}}{S_{t_0}}
\]

\[
\Delta \pi = \pi (USD) - \pi (PLN or CHF)
\]

\[
\Delta i = i (USD) - i (PLN or CHF)
\]

Data has a monthly frequency and is available from 2005 to 2013. Longer data sets are usually preferred for studies of PPP and UIP, so future research could usefully add to the current paper by including more data from the previous years.

All three countries emerged from a period of financial and price instability. Over the period, the monthly exchange rates between the US dollar and the Polish zloty and, respectively, between the US dollar and the Swiss franc were extremely volatile, mostly in the last four years due to the financial crisis. Both currencies have appreciated against the dollar during the period because they were seen as a safe-haven currency by Forex investors during the crisis. However, the central banks’ interventions increased the volatility of foreign exchange rates.

The inflation differentials among US and Poland, respectively Switzerland, are significant only in short period of times. For example, between February 2008 and July 2009, inflation differentials have increased and were probably the main reason...
behind the changes in the exchange rates. The latter functioned as an instrument of stabilization to compensate for the changes in domestic prices.

The interest rate differential between the US Federal Reserve (Fed) and the Polish Central Bank, respectively the Swiss National Bank could affect the value of these currencies when compared to each other.

Consequently, the value of the USD/PLN and USD/CHF pairs has decreased, due to the depreciation of the US dollar against the Polish zloty and the Swiss franc.

I present basic descriptive statistics of the changes in exchange rates, inflation rates differentials and interest rate differentials over the period chosen in Figure 1.

### Figure 1: Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-0.00061</td>
<td>-0.003639</td>
<td>-0.000237</td>
<td>0.001465</td>
<td>-1.763836</td>
<td>1.584923</td>
</tr>
<tr>
<td>StDev</td>
<td>0.042356</td>
<td>0.025214</td>
<td>0.004903</td>
<td>0.005302</td>
<td>1.033463</td>
<td>0.596917</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.14727</td>
<td>0.055873</td>
<td>0.0082</td>
<td>0.0128</td>
<td>-0.04</td>
<td>2.51</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.062619</td>
<td>-0.071304</td>
<td>-0.0211</td>
<td>-0.0154</td>
<td>-3.403182</td>
<td>0.272</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.376936</td>
<td>-0.020673</td>
<td>-1.093189</td>
<td>-0.485876</td>
<td>0.172764</td>
<td>-0.3798</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>5.402501</td>
<td>3.175386</td>
<td>6.163464</td>
<td>3.549164</td>
<td>1.466291</td>
<td>2.122004</td>
</tr>
</tbody>
</table>

The means of the monthly exchange rate changes are negative for both currency pairs. This suggests that both the Polish zloty and the Swiss franc have appreciated, on average, against the US dollar during the period. The inflation rate differential between United States and Poland has a negative mean, which indicates that the inflation rate in Poland was in many months below the inflation rate in the USA. On the contrary, the mean of the inflation rate differential between United States and Switzerland is positive which suggests that the inflation rate in Switzerland was above the inflation rate in the USA. Almost the same evolution can be observed for interest rate differentials between the two pairs.

High standard deviation results and the wide difference between minimum and maximum values show that changes in exchange rates and inflation rate differentials experienced high fluctuations between January 2005 and 2011. As expected, the USD/PLN pair was more volatile than the USD/CHF pair because the Polish zloty was semi-pegged to the Euro, a currency that was strongly affected in the last three years by both the financial crisis and the sovereign debt crisis. On the contrary, the Swiss franc is seen as a more stable currency, a defensive security. The Swiss franc kept appreciating against the US Dollar thanks to the Swiss financial and banking system which is characterised by important gold reserves of the Swiss central bank, banking secrecy, low taxation of investment income, but also thanks to the low interest rates policy run by the central bank in this period. The inflation rates differentials did not fluctuate much over the period.

Skewness measures indicate that the distribution of pairs containing the US Dollar and the Swiss franc is almost symmetric. On the contrary, changes in the exchange rates between the US Dollar and the Polish zloty are positively skewed, which means that there is more data on the left side of the curve and inflation rate differentials between United States and Poland have a negative Skewness that suggest there is a higher amount of data on the right of the curve.

Monthly changes in exchange rates between US dollar and Polish zloty and inflation differentials between United States and Poland have leptokurtic distributions (with positive excess kurtosis). In other words, they have a sharper peak and longer fatter tails which favours the emergence of extreme results, both positive and negative.

### REGRESSION RESULTS AND ALTERNATIVE WAYS TO TEST THE PPP AND UIP THEORIES

The next step is to employ a battery of regressions to analyze the data. The regression analysis tests whether inflation rate differentials and interest rate differentials are a good forecast for change in the future spot exchange rates based on the PPP and UIP theories.

The regressions will be applied firstly to the changes in exchange rates and the inflation rate differentials and secondly to the changes in exchange rates on interest rate differentials. In other words, monthly changes in exchange rates will be the dependent variable (Y) and the differentials in inflation rates, respectively the differentials in interest rates will be the independent variables (X).

Consequently, I will obtain the following equations:
According to the theory behind PPP, the changes in exchange rates should be explained only by the inflation differential. However, in the first two equations beta coefficient are significantly different from 1. This indicates that the changes in exchange rates have frequently deviated from the PPP line (the first bisector line). The slopes from equations (6) and (7) are not statistically significant.

The value of R-square tells us what percentage of the variability in the dependent variable (exchange rate changes) is explained by the regression on other variable, in my case the inflation rate differentials, respectively the interest rate differentials.

It provides a measure of how well future outcomes are likely to be predicted by the model. Unlike R-square, the adjusted R-square increases only if the new term improves the model more than would be expected by chance.

As shown in the figure above, only R-square coefficients from equations (4) and (5) are above 5%. They may suggest a relationship between changes in exchange rates and inflation rates over the period to some extent. In other words, almost 15% of the variation in USD/PLN pair may be explained by inflation differentials. Of possible explanation is that in Poland inflation rate was typically higher than in US, while in Switzerland changes in prices were in many months lower than in the US. On the other hand the R square coefficients computed for equations (6) and (7) are below 5%. This means that interest rates differentials explain in a very small proportion changes in the exchange rates.

The standard errors (standard deviations of the residuals) are very low for all my equations, so I could be pretty certain of the coefficient values.

The equations between changes in exchange rates and inflation rate differentials have t stats above 2 in absolute values and very low P-values. In my case I have taken into account the results computed for a level of significance greater than 95%, meaning that the P-value should be lower than 0.05, which holds true for equations (4) and (5). This indicates that the beta coefficient is statistically significant in both cases. On the contrary, I cannot reject the null hypothesis for equations (6) and (7) which have lower t-stats and higher P-values.

The F-test uses the method of least squares in order to identify the model that best fits the population from which the data were sampled and is extremely sensitive to non-normality. As for the t-tests, they are used to estimate the probability that a relationship observed in the data occurred by chance, the probability that the variables are really unrelated in the population and it represents a filter for unpromising hypotheses. In my case, results show that the model which takes into account inflation rates differentials explains to some extent the fluctuations in exchange rates. On the contrary, the regressions between changes in exchange rates and interest rates differentials are not very significant.

I have also run two multiple regressions, as seen below.

\[ \Delta S \text{ USD/PLN} = a + b \times (\pi \text{ USD} - \pi \text{ PLN}) + u \]  
(8)

\[ \Delta S \text{ USD/CHF} = a + b \times (\pi \text{ USD} - \pi \text{ CHF}) + c \times (i \text{ USD} - i \text{ CHF}) + u \]  
(9)

**Figure 3: Multiple regressions results**

<table>
<thead>
<tr>
<th>Equation (8)</th>
<th>B coeff</th>
<th>C coeff</th>
<th>R sq</th>
<th>Adj R sq</th>
<th>Stdrd error</th>
<th>t-statb</th>
<th>t-statc</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5214177</td>
<td>0.00163</td>
<td>0.1575</td>
<td>0.1351</td>
<td>0.039391</td>
<td>-3.65513</td>
<td>0.3586</td>
<td>7.01515</td>
<td></td>
</tr>
</tbody>
</table>
Although the R-squared coefficients have increased which indicates a greater part of the evolution changes in currency exchange rates is explained by the other two variables, the other results are still not statistically significant. Consequently, I believe that further investigations are needed.

Firstly, I used a more accurate method to analyse if the PPP holds. I have estimated the spot rates for my two currency pairs using the PPP formula:

\[
\Delta S_{PPP} = \frac{S^1 - S^0}{S^0} = \frac{1 + \pi_{HC} - 1}{1 + \pi_{FC}} \approx \pi_{HC} - \pi_{FC}
\]  

(10)

Then, I computed the q coefficients by dividing the actual spot values to the PPP spot estimations, using the following formula:

\[
q_t = \frac{Spot(Actual, t)}{Spot (PPP, t)}
\]

(11)

I obtained average q values of 0.9998 for USD/PLN and 1.0015 for USD/CHF, very close to 1.

Standard deviations were also very low, under 0.01 and suggest that the both currencies were rarely undervalued or overvalued against the US dollar. These results indicate that PPP theory holds to some extent over the period and I may use it, cautiously, to predict future exchange rates of these currencies against the USD. However, I should keep in mind that the Polish zloty was slightly overvalued and the Swiss franc was a bit undervalued between January 2006 and June 2011.

I have conducted a similar test for the UIP, but in this case I obtained different results. I calculated the UIP estimations using the following formula:

\[
\Delta S_{UIP} = \frac{E(S^1) - S^0}{S^0} = \frac{1 + i_{HC} - 1}{1 + i_{FC}} \approx i_{HC} - i_{FC}
\]

(12)

Then, I compared the results with the actual spot exchange rates. However, the estimations are not accurate at all. They indicate I cannot rely on this UIP model to make forecasts of the future exchange rates of these two currencies against the US dollar.

To sum up, regression results and basic UIP estimations (obtained above) cannot be used to make a reliable forecast of the future exchange rates in my case. On the other hand, PPP seems to hold over the period and it may help me to predict future movements in the exchange rates.

**POSSIBLE IMPROVEMENTS TO THE EMPirical ANALYSIS**

One way to improve the empirical the empirical analysis and that might lead to better results is to extend the time horizon, especially to test the UIP. The long-horizon regressions usually yield much more support for my theories. To be more explicit, in the short run, the failure of UIP results from risk premium shocks in the face of endogenous monetary policy. In the long run, in contrast, exchange rate movements are driven by the fundamentals, leading to relationships between interest rates and exchange rates that are more consistent with UIP.

Another tendency seen above and demonstrated in many scientific papers, is that there are special problems involved in forecasting prices of financial assets, such as exchange rates. Exchange rates are characterized by the phenomenon known as volatility clustering, that is, periods in which they exhibit wide swings for an extended time period followed by a period of comparative tranquillity.

So, it is highly probable to obtain spurious results for these kinds of variables. A possible solution to this problem is to employ the so-called autoregressive conditional heteroscedasticity (ARCH) or generalized autoregressive conditional heteroscedasticity (GARCH) models in order to capture such volatility clustering.

In order to apply better forecasting methods I need to verify that my chosen time series are stationary or they can be made stationary with appropriate transformations. A stochastic process is stationary if the mean and the variance are constant over time and there is no seasonality. The simple reason for requiring stationary data is that any model which is inferred from these data can itself be interpreted as stationary or stable, therefore providing valid basis for forecasting. So, first of all, I need to check that my series are stationary and if not I am going to test their first differences or second differences. So, I will employ the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) stationarity tests. The results are summarized in the following tables:

**Figure 4: Stationarity tests (US – Poland)**
<table>
<thead>
<tr>
<th>Variable</th>
<th>t-Statistic (ADF test statistic)</th>
<th>Adj. t-Stat PP test statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schwartz Probability Akaike Probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes exch rates</td>
<td>-5.819291 0</td>
<td>-3.369302 0.0634</td>
<td>-5.885758 0</td>
</tr>
<tr>
<td>Inflation diff</td>
<td>-5.138727 0.0003</td>
<td>-5.138727 0.0003</td>
<td>-4.946711 0.0007</td>
</tr>
<tr>
<td>Interest diff</td>
<td>-2.712025 0.2349</td>
<td>-2.712025 0.2349</td>
<td>-2.779611 0.2093</td>
</tr>
</tbody>
</table>

Figure 5: Stationarity tests (US – Switzerland)

<table>
<thead>
<tr>
<th>Variable</th>
<th>t-Statistic (ADF test statistic)</th>
<th>Adj. t-Stat PP test statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schwartz Probability Akaike Probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes exch rates</td>
<td>-7.478971 0</td>
<td>-7.478971 0</td>
<td>-7.441332 0</td>
</tr>
<tr>
<td>Inflation diff</td>
<td>-5.263964 0.0003</td>
<td>-5.263964 0.0003</td>
<td>-10.88335 0</td>
</tr>
<tr>
<td>Interest diff</td>
<td>-1.821058 0.685</td>
<td>-1.821058 0.685</td>
<td>-1.821058 0.685</td>
</tr>
</tbody>
</table>

I observe that changes in exchange rates and inflation rate differentials have probabilities lower than 0.05 and high absolute values for t-Statistic. In consequence, I assume that these series are stationary and I can use them as such in my analysis. As for the interest differential variables, the ADF tests using both criteria (Schwartz and Akaike) as well as the PP tests failed to reject the null, so I cannot assume stationarity for these variables.

I have also got a glimpse of the correlograms of these variables that confirmed to some extent my unit root tests results and my primary assumptions.

Further on, I have performed unit root tests in the 1st difference for the interest rates variable. The results below clearly show that I can now reject the null hypothesis.

Figure 6: Stationarity tests for interest rate differentials (1st difference)

<table>
<thead>
<tr>
<th>Variable</th>
<th>t-Statistic (ADF test statistic)</th>
<th>Adj. t-Stat PP test statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schwartz Probability Akaike Probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Poland</td>
<td>-7.875216 0</td>
<td>-7.875216 0</td>
<td>-7.875216 0</td>
</tr>
<tr>
<td>US - Switzerland</td>
<td>-8.740114 0</td>
<td>-8.740114 0</td>
<td>-8.742568 0</td>
</tr>
</tbody>
</table>

I will run a regression of currency exchange rates on all the other factors and because interest rates differentials are stationary only in the first difference, I have to use the first difference of the other variables as well, even if they are stationary in levels.

Figure 7: Multiple regression results using 1st differences (Eviews):
I observe that results are not improved for the US-Poland pair, but gain significance for the US–Switzerland pair (higher t statistic for interest differentials, higher R-squared and higher F-statistic).

Another way that would lead to better results is to identify the suitable ARMA model with the help of the correlograms and partial correlograms. I observe the correlograms of the variables in the first difference. The tools in identification are the autocorrelation function (ACF) and the partial autocorrelation function (PACF).

However, the results suggest that there are other factors besides inflation and interest rates differentials that influence exchange rate movements. For example, I have tested the relationship between changes in currency exchange rates and trade differentials in terms of exports.

Through exports, a country receives more foreign currency and adds pressure on the country’s exchange rate until domestic goods and services are sold at an acceptable price. I have verified the following regressions:

\[ \Delta S_{USD/PLN} = a + b \times (\text{Exp USD} - \text{Exp PLN}) + u \]  
(13)

\[ \Delta S_{USD/CHF} = a + b \times (\text{Exp USD} - \text{Exp CHF}) + u \]  
(14)

However, I still did not obtain significance, as seen in the table below.

---

### Dependent Variable: D(CHANGESFXUSPOLAND)

**Method: Least Squares**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(INFLATIONDIFUSPOLAND)</td>
<td>-1.660639</td>
<td>1.115492</td>
<td>-1.488705</td>
<td>0.1408</td>
</tr>
<tr>
<td>D(INTERESTDIFFUSPOLAND)</td>
<td>0.027026</td>
<td>0.023361</td>
<td>1.156908</td>
<td>0.2510</td>
</tr>
<tr>
<td>C</td>
<td>0.000429</td>
<td>0.005416</td>
<td>0.079283</td>
<td>0.9370</td>
</tr>
</tbody>
</table>

R-squared: 0.040297  Mean dependent var: -8.21E-06

Adjusted R-squared: 0.014359  S.D. dependent var: 0.047770

S.E. of regression: 0.047426  Akaike info criterion: -3.221107

Sum squared resid: 0.166443  Schwarz criterion: -3.129790

Log likelihood: 127.0126  F-statistic: 1.553598

Durbin-Watson stat: 2.505096  Prob(F-statistic): 0.218304

---

### Dependent Variable: D(CHANGESFXUSSWISS)

**Method: Least Squares**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(INFLATIONDIFUSSWISS)</td>
<td>-1.496930</td>
<td>0.510567</td>
<td>-2.931895</td>
<td>0.0045</td>
</tr>
<tr>
<td>D(INTERESTDIFFUSSWISS)</td>
<td>0.033645</td>
<td>0.016618</td>
<td>2.024669</td>
<td>0.0465</td>
</tr>
<tr>
<td>C</td>
<td>-0.000645</td>
<td>0.003382</td>
<td>-0.190771</td>
<td>0.8492</td>
</tr>
</tbody>
</table>

R-squared: 0.171485  Mean dependent var: -0.000850

Adjusted R-squared: 0.149093  S.D. dependent var: 0.032134

S.E. of regression: 0.029642  Akaike info criterion: -4.161090

Sum squared resid: 0.065018  Schwarz criterion: -4.069773

Log likelihood: 163.2020  F-statistic: 7.658238

Durbin-Watson stat: 2.614582  Prob(F-statistic): 0.000949
Figure 8: Regression between currency exchange rates and exports differentials

<table>
<thead>
<tr>
<th></th>
<th>Beta coeff</th>
<th>R sq</th>
<th>Adj R sq</th>
<th>Std error</th>
<th>t-stat</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation (13)</td>
<td>0.000376844</td>
<td>0.009309</td>
<td>-0.00570122</td>
<td>0.0438903</td>
<td>0.787518</td>
<td>0.620184</td>
</tr>
<tr>
<td>Equation (14)</td>
<td>-0.000108483</td>
<td>0.002362</td>
<td>-0.01275371</td>
<td>0.0255038</td>
<td>-0.3953</td>
<td>0.156262</td>
</tr>
</tbody>
</table>

R-square, t-statistic and F-statistic are very low and suggest no relationship between exports and currency exchange rates in my case.

Instead of exports I could also test other factors that might influence changes in exchange rates, such as trade balance, monetary policy, industrial production or public debt. I could also test other interest rates (e.g. 3-month deposit interest rates or key interest rates).

**CONCLUDING REMARKS**

My paper studies the relationships between exchange rates changes, inflation rate changes and interest rate differentials in the PPP and UIP frameworks. I use two currencies – the Polish zloty and the Swiss franc in my analysis and a time interval of five years and a half with monthly frequency. I find that the PPP almost holds over the period, while the relationship between changes in exchange rates and interest rate differentials is weak over the period. The article also shows that the volatility in foreign exchange markets was high and in some months movements of exchange rates were hardly predictable.

My results have a number of implications for your decision. First, the fact that the UIP does not hold in reality means that you could explore a variety of international profit opportunities, either from arbitrage or from speculation. Then, you could use the PPP as a forecasting tool for the direction of exchange rate change.

**BIBLIOGRAPHY**


