Financial, Public and Regional Economics

The Influence of International Parity on the Exchange Rate: Purchasing Power Parity and International Fisher Effect

Oana Mionel[1]

Abstract: This article assesses the impact of the inflation and interest rates on the exchange rates. The analysis tests the relation between the inflation rate and the exchange rate by applying the Purchasing Power Parity Theory, while the relation between the interest rate and the inflation rate is tested by applying the International Fisher Effect Theory. In order to test the Purchasing Power Parity the study takes into account the period of time between 1990 – 2009, and the following countries – the USA, Germany, the UK, Switzerland, Canada, Japan and China. As for testing the International Fisher Effect Theory the period of time is the same, 1990 – 2009, but a few countries are different – the USA, Germany, the UK, Switzerland, Canada, Australia and New Zeeland. Thus, both theories analyse the USA as home country.

Key words: exchange rate; inflation rate; interest rate.

JEL Classification: F31; G14; G15.

1. Introduction

The analysis of the exchange rate influence factors was always based on the economic theories which take into account *the invisible hand theory* which was invented by Adam Smith. In theory, following the model of the prices of goods and services which are set by the demand and supply, the exchange rate of a currency should be set accordingly. However, *the shifts* within the business environment and the exchange market, starting with 1970, determine the creation of exchange rates on the one hand, and their conditioning to meet the *economic-financial factors* on the other. These factors are the inflation rate, the interest rate, the differences of economic growth, the different manner of applying monetary policies, the economic relations between different countries, the goods prices, the fluctuations of business cycles, the tendency of international currency portfolios, the direction of international equity flows and the change of vision on the part of the investors due to the economic, political and social future.

[1] Senior Lecturer, PhD, The Faculty of International Business and Economics, "Dimitrie Cantemir" Christian University, Romania, 176 Splaiul Unirii, 4 District, Bucharest, Romania, tel. 0040213308931, Corresponding author: panaoana2005@yahoo.com.

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2. Purchasing Power Parity and International Fisher Effect testing

The inflation and interest rates may have a significant impact on the exchange rate. That is why the market participants who are not protected against the exchange risk have to understand the relation between the exchange rate, the interest and inflation rates in order to find out why the fervent debates regarding the inflation rate in the financial media may or may not influence the exchange rate.

2.1. Purchasing Power Parity (PPP) testing

Purchasing Power Parity (PPP) is one of the most popular but also debated theory in international finance. This theory supports its financial forecast of the exchange movement on the inflation rate differential between countries.

There are two versions of the Purchasing Power Parity Theory: the Purchasing Power Parity in its *absolute version* and the Purchasing Power Parity in its *relative version*. As PPP in its absolute version analyses the situation where there are no barriers and no fares in world commerce, which is not a real situation, I shall present the PPP analysis in its relative version.

2.1.1. The data

Table 1. Inflation rates for 1999 – 2009

	USA	Germany	United Kingdom	Switzerland	Canada	Japan	China
1990	5.419	2.687	7.036	5.404	4.780	3.067	3.100
1991	4.216	3.474	7.413	5.860	5.626	3.401	3.400
1992	3.042	5.046	4.297	4.037	1.490	1.644	6.400
1993	2.970	4.476	2.497	3.293	1.865	1.314	14.700
1994	2.596	2.717	2.071	0.852	0.136	0.599	24.100
1995	2.805	1.729	2.625	1.800	2.189	-0.099	17.100
1996	2.937	1.193	2.442	0.812	1.580	0.099	8.300
1997	2.338	1.533	1.816	0.520	1.612	1.885	2.800
1998	1.547	0.602	1.561	0.018	0.987	0.584	-0.800
1999	2.193	0.635	1.317	0.806	1.744	-0.290	-1.400
2000	3.367	1.400	0.867	1.559	2.738	-0.777	0.400
2001	2.817	1.904	1.182	0.989	2.507	-0.685	0.725
2002	1.596	1.355	1.274	0.643	2.276	-0.887	-0.767

2003	2.298	1.031	1.363	0.638	2.742	-0.298	1.167
2004	2.668	1.790	1.344	0.803	1.841	0.000	3.900
2005	3.379	1.920	2.041	1.172	2.230	-0.299	1.817
2006	3.222	1.784	2.300	1.060	2.018	0.300	1.467
2007	2.860	2.276	2.346	0.732	2.131	0.000	4.767
2008	3.798	2.754	3.629	2.428	2.378	1.396	5.900
2009	-0.391	0.135	2.166	-0.446	0.292	-1.377	-0.685

The use of the Purchasing Power Parity Theory lets us evaluate the impact of inflation on the exchange rate. In order to test this theory the author has used the inflation rate data from the USA (i.e. the American dollar), Germany (the euro), the UK (the pound sterling), Switzerland (the Swiss franc), Canada (the Canadian dollar), Japan (the yen) and China (renminbi). The period of time taken into account was 1990 – 2009, and the data was provided by the *International Monetary Fund – World Economic Outlook Database.*

Table 2 The calculation of the inflation rate differential and of the percentage change for Germany, the UK, Switzerland and Canada

	$\frac{(1+I_{USA})}{(1+I_{Germany})}-1$ (%)	$I_{USA}-I_{Germany}$ (%)	$\frac{(1+I_{USA})}{(1+I_{U.K.})}-1$ (%)	$I_{USA}-I_{U.K.}$ (%)	$\frac{(1+I_{USA})}{(1+I_{Switz})}-1$ (%)	$I_{USA}-I_{Switz}$ (%)	$\frac{(1+I_{USA})}{(1+I_{Canada})}-1$ (%)	$I_{USA}-I_{Canada}$ (%)
1990	2.397	2.732	-1.762	-1.617	-0.241	0.015	0.352	0.639
1991	0.717	0.742	-2.976	-3.197	-1.552	-1,.644	-1.334	-1.41
1992	-1.907	-2.004	-1.203	-1.255	-0.956	-0.995	-1.468	1.552
1993	-1.441	-1.506	0.461	0.473	-0.312	-0.323	1.084	1.105
1994	-0.117	-0.121	0.514	0.525	1.729	1.744	2.456	2.46
1995	1.057	1.076	0.175	0.18	0.987	1.005	0.602	0.616
1996	1.723	1.744	0.190	0.495	2.107	2.125	1.335	1.357
1997	0.792	0.805	0.512	0.522	1.808	1.818	0.714	0.726
1998	0.939	0.945	-0.013	-0.014	1.528	1.529	0.554	0.56
1999	1.548	1.558	0.864	0.876	1.375	1.387	0.444	0.449
2000	1.939	1.967	2.478	2.5	1.780	1.808	0.612	0.629
2001	0.895	0.913	1.615	1.635	1.810	1.828	0.302	0.31
2002	0.237	0.241	0.317	0.322	0.946	0.953	-0.664	-0.68
2003	1.648	1.267	0.922	0.935	1.649	1.66	-0.432	-0.444
2004	0.862	0.878	1.306	1.324	1.850	1.865	0.812	0.827
2005	1.431	1.459	1.311	1.338	2.181	2.207	1.123	1.149
2006	1.412	1.438	0.901	0.922	2.139	2.162	1.180	1.204
2007	0.571	0.584	0.502	0.514	2.112	2.128	0.713	0.729
2008	1.016	1.044	0.163	0.169	1.337	1.37	1.387	1.42
2009	-0.525	-0.526	-2.502	-2.557	0.055	0.055	-0.681	-0.683

Table 3. The calculation of the inflation rate differential and of the percentage change for the Japanese and Chinese currencies

	$\frac{(1+I_{USA})}{(1+I_{Japan})}-1$ (%)	$I_{USA}-I_{Japan}$ (%)	$\frac{(1+I_{USA})}{(1+I_{China})}-1$ (%)	$I_{USA}-I_{China}$ (%)
1990	2.282	2.352	2.249	2.319
1991	0.788	0.815	0.789	0.816
1992	1.375	1.398	- 3.156	- 3.358
1993	1.634	1.656	- 10.226	- 11.73
1994	1.985	1.997	- 17.327	- 21.504
1995	2.906	2.904	- 12.207	- 14.295
1996	2.830	2.838	- 4.951	- 5.363
1997	0.440	0.453	- 0.449	- 0.462
1998	0.950	0.963	2.365	2.347
1999	2.490	2.483	3.644	3.593
2000	4.170	4.144	3.367	2.967
2001	3.530	3.502	2.076	2.092
2002	2.500	2.483	2.384	2.363
2003	2.600	2.596	1.117	1.131
2004	2.668	2.668	-1.185	- 1.232
2005	3.689	3.678	1.534	1.562
2006	2.913	2.922	1.729	1.755
2007	2.86	2.860	- 1.820	- 1.907
2008	2.368	2.402	- 1.984	- 2.104
2009	0.999	0.986	0.296	0.294

2.1.2. The Applied Methodology

This analysis considers the USA as the home country (*home country* - *h*), while Germany, the UK, Switzerland, Canada, Japan and China are analysed as foreign countries (*foreign country* - *f*). We have calculated the inflation rate differential *(*Δ *INF*) and the percentage change for the currency (e_f) for each group of countries and we took into account the relations according to the purchasing power parity:

a) Δ INF = I_h - I_f **b)** $e_f = \frac{1+I_h}{1+I_f} - 1$

Thus, according to the Purchasing Power Parity Theory we may assess the inflation impact on the exchange rate. The coordinates of each point in the figures are given by the percentage change of the rate differential between the home country and the foreign country as well as by the percentage change of the exchange rate. In theory, PPP says that if the inflation rate differential is *X%* , then the percentage change of the exchange rate should be the same *X%* . If the exchange rate does not change according to the PPP theory, then there must be disparities regarding the purchasing power of the two analysed countries.

The diagonal that connects all these points is known as *the PPP line*. Thus, the outcome may be compared according to the PPP line:

- The points which are above the PPP line present the relation I_h - $I_f > e_f$, which describes the situation where foreign goods become cheaper for the home country;
- The points which are below the PPP line present the relation I_h - $I_f < e_f$, which describes the situation where foreign goods become more expensive compared to the those in the home country.

If the points are extremely distant from the PPP line, then the percentage change for the currency value was not influenced by the inflation rate differential, as the PPP theory says.

Moreover, the *regression model* was also applied to the data. The analysis of *the regression* presupposes the description and assessment of the possible relation that exists between a dependent and an independent variable (Spircu & Ciumara, 2007, p. 27). In this respect, the most facile technique which illustrates the linear dependence between two or more variables is known as *linear regression*.

In order to describe a model a general regression, we take Y as the variable whose modification we wish to explain, with the help of k variables, $X_{1,}X_{2,......,}X_k$. The table below presents the terminology used for this variable in the literature (Spircu & Ciumara, 2007, p. 29):

Table 4 Names of variables

Names of Y	**Names of $X_{1,}X_{2,......,}X_k$**
The dependent variable	Independent variables
The regressant	Regressors
The effect variable	Causal variables
The explained variable	Predictor variables

Within this analysis the dependent variable is the exchange rate (e_f), while the independent variable is the inflation rate differential ($I_h - I_f$ or Δ INF). Thus, according to the data, the unifactorial econometric model is built as: $y_i = f(x_i) + u_i$, where:

- y_i is the real values of the dependent variable;
- x_i is the real values of the independent variable;
- u_i is the residual variable, which represents the influences of the other factors of the y_i variable, and which are not specified in the model; they are considered random factors with insignificant influences on the y_i variable.

According to the described economic process, the data analysis from tables 19 and 20 leads to the following specification: y_i is the exchange rate, and it represents the dependent variable; x_i is the inflation rate differential, and it represents the independent variable, that is the factor of influence on the exchange rate, as it is considered by the hypothesis.

To specify an econometric model also presupposes choosing a mathematical function $(f(x))$ by the help of which we may reveal the connection between the two variables. The most frequently used procedure in the case of a unifactorial model (the study uses only one dependent and one independent variable) is the graphic representation of the two rows of values with the help of the *correlogram* (Tănăsoiu & Iacob, 2005, p. 35). Thus, if we have n pair observations $(y_{i,} x_i), i = 1,2,..., n$, on the variables Y and X, then the model of linear regression may be written such as: $y_i = \alpha + \beta x_i + e_i$, where:

- α is the interceptor (the place on the line where the regression line intersects OY). According to the direction and steepness of the α line it may be either positive or negative.
- β is the regression coefficient (the quantity that modifies y when x is modified by one unit).

2.1.3. Outcome

Thus, after accomplishing the correlograms we may comment on the distribution of points in a system of axes which have the coordinates OX and OY. The visual analysis of the cloud form offers important hints on the relation between the two variables, the exchange rate and the inflation rate differential. In this respect, we may notice the linear associations first. In order to synthesise the manner in which the changes of Y (the exchange rate) are associated with the changes of X (the inflation rate differential), the mathematic method used here is “the methods of the smallest squares". This method finds "the most suitable" line for a set of analysed data. When the collected data are represented as points in the graphic and seem to gather close to the line that was drawn in the middle, the distance between the line and the points varies according to the line. The average of the square distances is considered to be a measure of "perfect fitting" to this line. The straightest line is that for which the square deviation is minimum. It is desirable that the line pass the arithmetical average (x, y) from the matrix. The term that is used for this line is *the regression line*. According to the Purchasing Power Parity Theory, if the points do not significantly deviate from the line – for the graphics showing the relation between the USA and Germany, the UK, Switzerland and Japan – then it is clear that during that time the rate differential was an influential factor for the exchange rate. The regression slope for the relation USA – Germany ($y = 1{,}0327x - 0{,}0228$), USA – UK ($y = 1{,}0234x + 0{,}0113$), USA – Switzerland ($y = 1{,}0064x + 0{,}0111$), USA – Japan ($y = 1{,}0391x - 0{,}1152$) points out the following: the value of β is positive, therefore the dependence between the two variables is in direct proportion; thus, an increase of the inflation rate differential with a unit has determined the foreign currency to be higher.

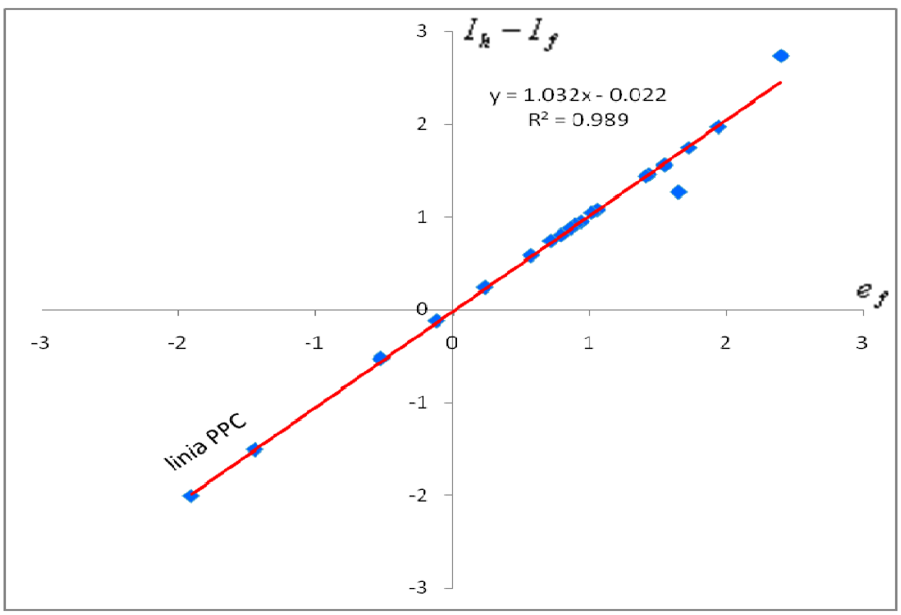

Figure 1. USA - Germany (PPP)

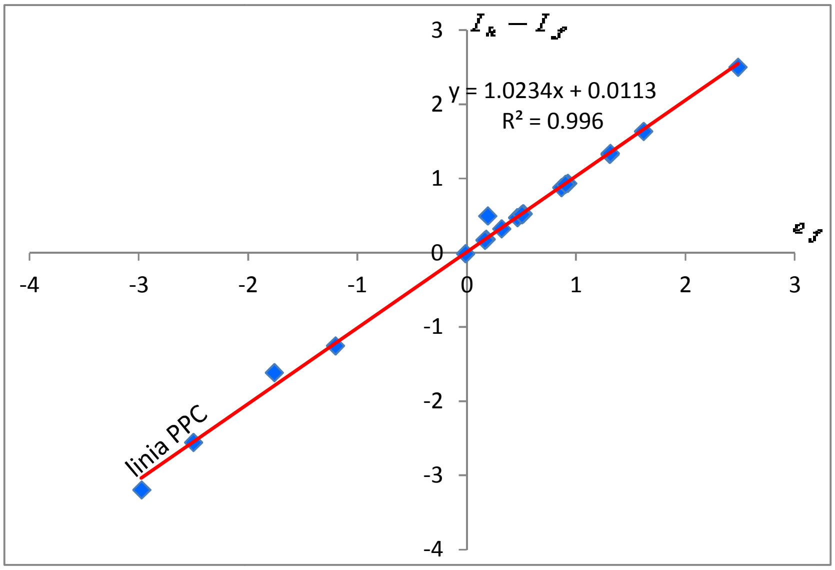

Figure 2. USA – UK (PPP)

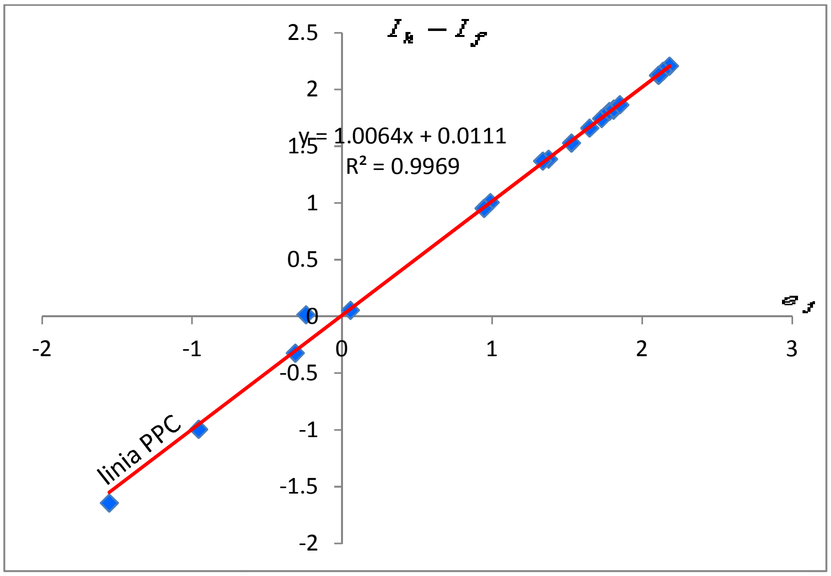

Figure3. USA – Switzerland (PPP)

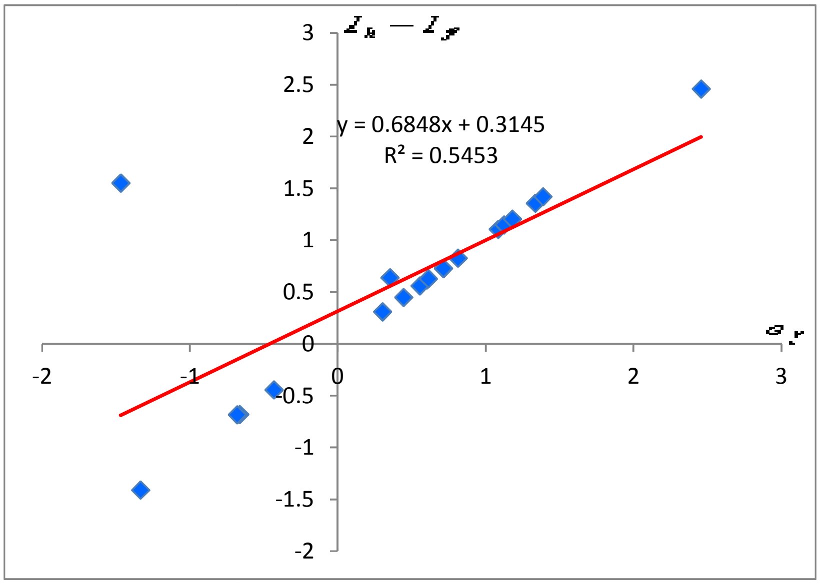

Figure 4. USA – Canada (PPP)

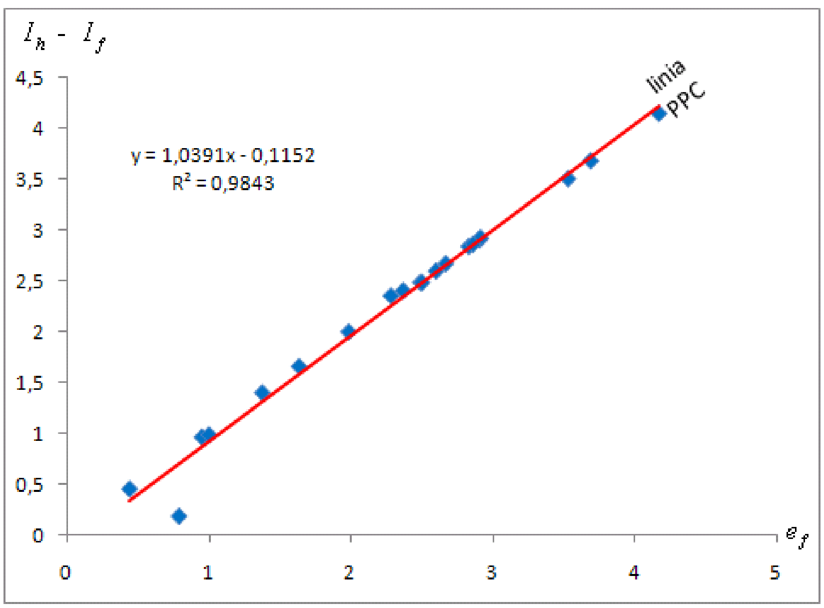

Figure 5. USA – Japan (PPP)

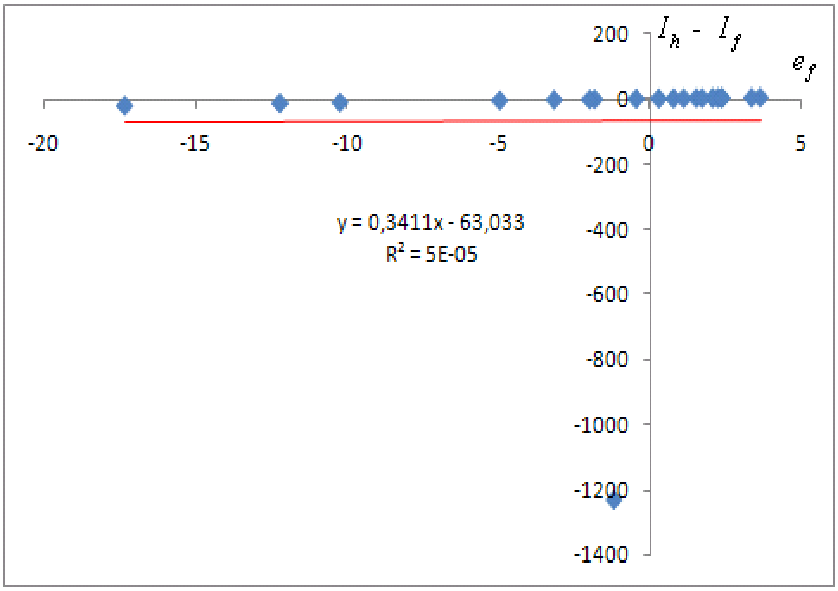

Figure 6. USA – China (PPP)

Another hint of the association between the two variables – the exchange rate and the inflation rate differential – is given by *the correlation coefficient* (R^2). This coefficient varies between –1 and +1. Thus, the closer it gets to +1, the stronger the dependence between the two variables. However, when the index tends to –1, the coefficient shows the reverse correlation. But when it is equal to 0, it shows the lack of any correlation. The correlation coefficient is defined as follows:

$$R^2 = \frac{\sum(x_i - \bar{X})(y_i - \bar{Y})}{\sqrt{\left(\sum(x_i - \bar{X})^2\right)\left(\sum(y_i - \bar{Y})^2\right)}}$$

As we can see in the graphics above, the correlation coefficient (R^2) for USA – Germany, USA – UK, USA – Switzerland, USA – Japan is 0,9894, 0,996, 0,9969 and 0,9843. These results are very close to +1, which shows the influence exercised by the inflation rate differential on the exchange rate.

The graphic representation of the relation USA – Canada, and of the corresponding regression line suggest the fact that the errors resulted from the regression linear pattern are substantial (we may take the determination coefficient into account, as it is low – 0,5453). The outcome analysis shows that the inflation rate differential did not influence the exchange rate during the analysed period for the relation USA

– Canada. Moreover, the correlogram for the relation USA – Canada demonstrates that there is no correlation between the inflation rate differential and the exchange rate. The conclusion is that the Chinese exchange rate is manipulated by the Chinese authorities, even if China announced a new free flow exchange rate system since July 21 (Ferrington, 2007, p. 8).

2.2. International Fisher Effect (IFE) testing

Besides Purchasing Power Parity Theory there is also another important theory in international finance – International Fisher Effect Theory (IFE). In order to explain the movement of the exchange rate, this theory uses *the interest rate*. IFE is connected to PPP as the interest rates are connected to the inflation rates. Thus, the countries which have high inflation rates also have high nominal interest rates – both as a means to counterattack the inflation pressure and to counterattack high inflation so as to offer the real yield rate to the investors. With the help of the International Fisher Effect Theory we may assess the impact of the interest rate on the exchange rate.

2.2.1. The data

In order to test the IFE theory the author has used the interest rate data from the USA (the American dollar), Germany (the euro), the UK (the pound sterling), Switzerland (the Swiss franc), Canada (the Canadian dollar), and New Zeeland (the New Zeeland dollar). The period of time which was taken into account was 1990 – 2009, and the data was provided by the *Organisation For Economic Cooperation and Development.*

Table 4. Short term interest rates for 1999 – 2009

	USA	Germany	UK	Switzerland	Canada	Australia	New Zeeland
1990	8.148	8.488	14.769	8.918	13.008	14.54	13.89
1991	5.835	9.247	11.523	8.214	9.031	10.23	9.97
1992	3.682	9.518	9.623	7.854	6.669	6.47	6.73
1993	3.174	7.295	5.940	4.906	5.040	5.15	6.33
1994	4.629	5.364	5.502	4.189	5.546	5.66	6.74
1995	5.917	4.532	6.681	2.948	7.126	7.73	9.01

1996	5.390	3.305	6.023	2.020	4.452	7.15	9.30
1997	5.616	3.325	6.828	1.638	3.556	5.40	7.66
1998	5.467	3.544	7.338	1.549	5.059	5.00	7.35
1999	5.330	2.964	5.449	1.409	4.916	5.01	4.83
2000	6.456	4.392	6.107	3.173	5.696	6.18	6.52
2001	3.687	4.262	4.972	2.863	3.995	4.90	5.74
2002	1.726	3.319	3.993	1.128	2.621	4.75	5.67
2003	1.151	2.333	3.666	0.329	2.965	4.90	5.42
2004	1.563	2.106	4.571	0.485	2.311	5.48	6.13
2005	3.512	2.185	4.698	0.810	2.810	5.64	7.11
2006	5.153	3.079	4.798	1.557	4.177	5.99	7.55
2007	5.268	4.278	5.954	2.572	4.618	6.67	8.33
2008	2.965	4.634	5.491	2.483	3.307	6.97	8.02
2009	0.556	1.228	1.200	0.363	0.692	3.43	3.03

Table 5. The calculation of the interest rate differential and of the percentage change for the German, British, Swiss and Canadian currencies

	$\frac{(1+i_{USA})}{(1+i_{Germ.})}-1$ (%)	$i_{USA}-i_{Germ.}$ (%)	$\frac{(1+i_{USA})}{(1+i_{U.K.})}-1$ (%)	$i_{USA}-i_{U.K.}$ (%)	$\frac{(1+i_{USA})}{(1+i_{Switz.})}-1$ (%)	$i_{USA}-i_{Switz.}$ (%)	$\frac{(1+i_{USA})}{(1+i_{Canada})}-1$ (%)	$i_{USA}-i_{Canada}$ (%)
1990	-0.313	- 0.34	-5.768	-6.621	-0.706	-0.77	-4.3	-4.86
1991	-3.123	- 3.412	-5.100	-5.688	-2.198	-2.379	-2.931	-3.196
1992	-5.328	-5.836	-5419	-5.941	-3.868	-4.172	-2.8	-2.987
1993	-3.840	-4.121	-2.610	-2.766	-1.651	-1.732	-1.776	-1.866
1994	-0.697	-0.735	-0.827	-0.873	0.422	0.44	-0.868	-0.917
1995	1.324	1.385	-0.716	-0.764	2.883	2.969	-1.128	-1.209
1996	2.018	2.085	-0.597	-0.633	3.303	3.37	0.898	0.938
1997	2.217	2.291	-1.134	-1.212	3.913	3.978	1.989	2.06
1998	1.857	1.293	-1.743	-1.871	3.858	3.918	0.388	0.408
1999	2.297	2.366	-0.112	-0.119	3.866	3.921	0.394	0.414
2000	1.977	2.064	0.328	0.349	3.182	3.283	0.719	0.76
2001	-0.551	-0.575	-1.224	-1.285	0.801	0.824	-0.296	-0.308
2002	-1.418	-1.593	-2.179	-2.267	0.591	0.598	-0.872	-0.895
2003	-1.155	-1.182	-2.426	-2.515	0.819	0.822	-1.761	-1.814
2004	-0.531	-0.543	-2.876	-3.008	1.072	1.078	-0.731	-0.748
2005	1.298	1.327	-1.132	-1.186	2.680	2.702	0.682	0.702
2006	2.012	2.074	0.340	0.355	3.540	3.596	0.936	0.976
2007	0.949	0.99	-0.647	-0.686	2.628	2.696	0.621	0.65
2008	-1.595	-1.669	-2.394	-2.526	0.470	0.482	-0.331	-0.342
2009	-0.663	-0.672	-0.636	-0.644	0.192	0.193	-0.135	-0.136

Table 6. The calculation of the interest rate differential and of the percentage change for the Australian and New Zeeland currencies

	$\frac{(1+i_{USA})}{(1+i_{Australia})}-1$ (%)	$i_{USA}-i_{Australia}$ (%)	$\frac{(1+i_{USA})}{(1+i_{NewZeeland})}-1$ (%)	$i_{USA}-i_{NewZeeland}$ (%)
1990	-5.580	-6.392	-5.041	-5.742
1991	-3.987	-4.395	-3.760	-4.135
1992	-2.618	-2.788	-2.855	-3.048
1993	-1.879	-1.976	-2.968	-3.156
1994	-0.975	-1.031	-1.977	-2.111
1995	-1.682	-1.813	-2.837	-3.093
1996	-1.642	-1.76	-3.577	-3.91
1997	0.204	0.216	-1.898	-2.044
1998	0.444	0.467	-1.754	-1.883
1999	0.304	0.32	0.476	0.5
2000	0.259	0.276	-0.060	-0.064
2001	-1.156	-1.213	-1.941	-2.053
2002	-2.886	-3.024	-3.732	-3.944
2003	-3.573	-3.749	-4.049	-4.269
2004	-3.713	-3.917	-4.303	-4.567
2005	-2.014	-2.128	-3.359	-3.598
2006	-0.789	-0.837	-2.228	-2.397
2007	-1.314	-1.402	-2.826	-3.062
2008	-3.744	-4.005	-4.679	-5.055
2009	-2.778	-2.874	-2.401	-2.474

2.2.2. Applied Methodology

In the process of testing the IFE theory, the USA was considered the home country (*h*), while Germany, the UK, Switzerland, Canada, Australia and New Zeeland were analysed as foreign countries (f). For each group of counties the author has calculated the interest rate differential *(Δ INT*) and the percentage change in the currency value (e_f) according to the IFE relations:

a) Δ INF = i_h - i_f b) $e_f = \frac{1+i_h}{1+i_f} - 1$

The use of the IFE theory helped the author assess the impact of the interest rate on the exchange rate. Each point in the graphics has the percentage change in the inflation rate differential between the home country and the foreign country, and the percentage change of the exchange rate as coordinates. In theory, IFE states that if the interest rate differential is *y%* then the percentage change of the exchange rate should be *y%* as well. The line which unites all these points is known as *the IFE line* and it reflects the exchange rate adjustment to compensate for the inflation rate differential. Thus, outcome may be compared according to *the IFE line*:

- All the points which are situated on the IFE line show that the investors get the same yield, no matter if they invest in the home country, or abroad;
- The points which are above the IFE line confirm the relation (I_h - I_f **)** > e_f whose interpretation is the fact *the investment yield in the home country is higher than the one abroad*;
- The points which are below the IFE line confirm the relation **(** I_h - I_f **)** < e_f whose interpretation is that *the investment yield in the home country is lower than the one abroad*;
- If the point significantly deviates from the IFE line, then the percentage change of the currency value was not influenced by the inflation rate differential as the IFE theory suggests.

We applied the regression model for the IFE theory as we did for the PPP theory. Within the analysis the dependent variable is the exchange rate (e_f), and the independent variable if the interest rate ($i_h - i_f$ or Δ INT). According to the data, the econometric unifactorial model is: $y_i = f(x_i) + u_i$, where:

- y_i represents the real values of the dependent variable;
- x_i is the real values of the independent variable;
- u_i is the residual value, and it represents the influences of the other factors of y_i variable which are not specified in the model and are considered to be random, having insignificant influences on y_i variable.

The data analysis from tables 22 and 23, lead to the following specifications: y_i represents the exchange rate, which is considered the dependent variable; x_i is the interest rate differential, which is the independent variable, i.e. the influential factor on the exchange rate considered in the hypothesis.

The econometric model also presupposes to choose a mathematical function $(f(x))$ which will connect the two variables. The process that is most often used in the case of a unifactorial model is the graphic representation of the two rows of values with the *correlogram*. Therefore, if we have n pairs of observations $(y_{i,} x_i)$, *i = 1, 2, ..., n,* on Y and X , then the simple linear regression model may be written as: $y_i = \alpha + \beta x_i + e_i$, where:

- α is the interceptor (the place on the regression line where it intersects OY). According to the direction and the inclination of the line α may be positive or negative.
- β is the regression coefficient (the quantity by which y is modified when x is modified by one unit).

2.2.3. Outcome

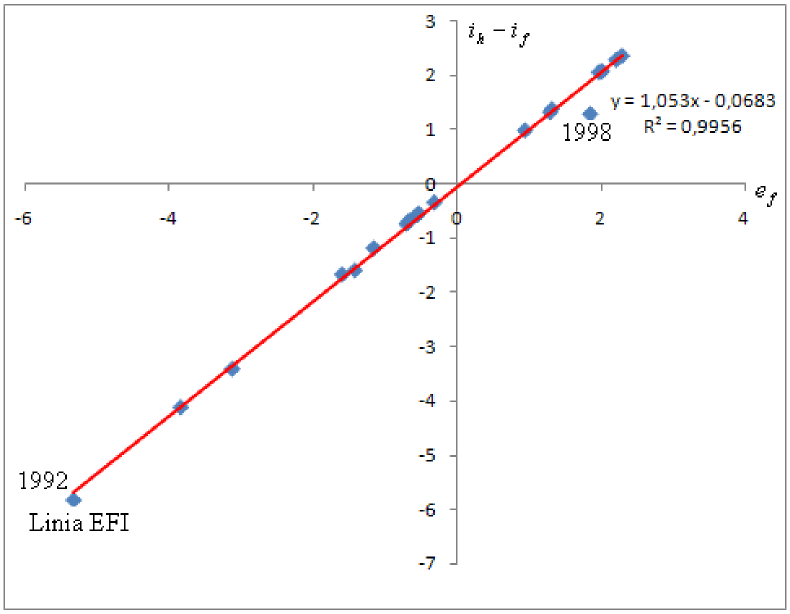

Figure 7. USA – Germany (IFE)

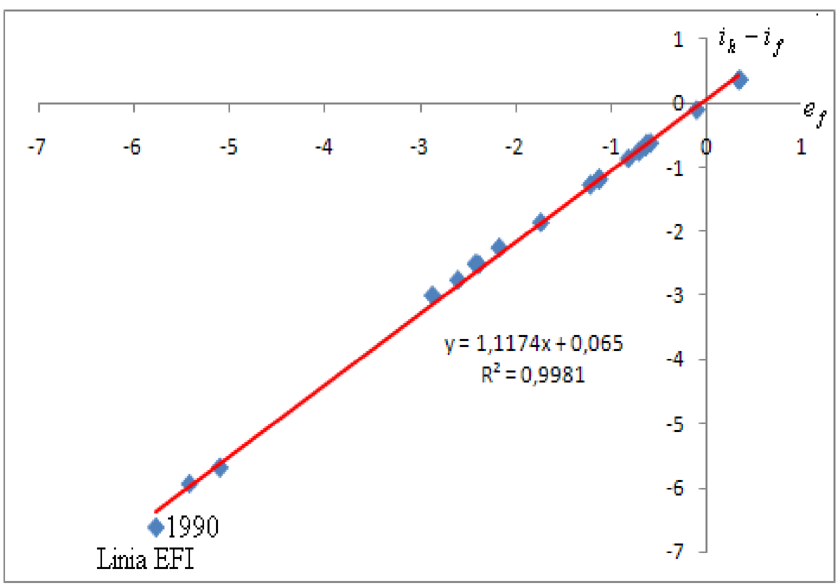

Figure 8. USA – UK (IFE)

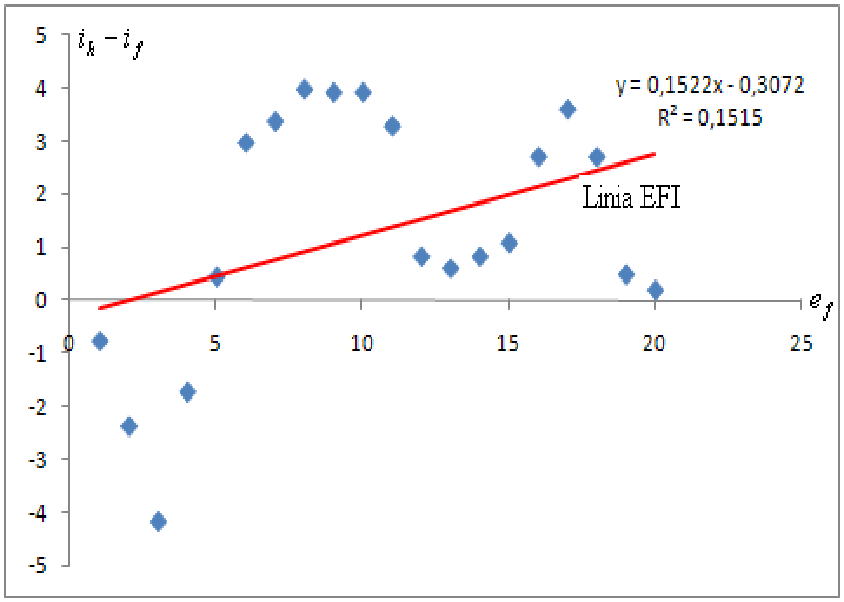

Figure 9. USA – Switzerland (IFE)

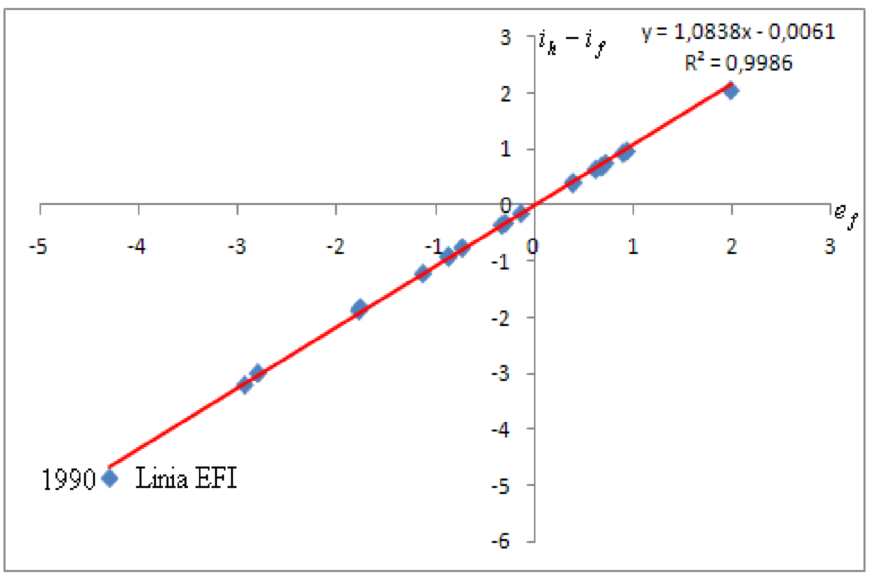

Figure 10. USA – Canada (IFE)

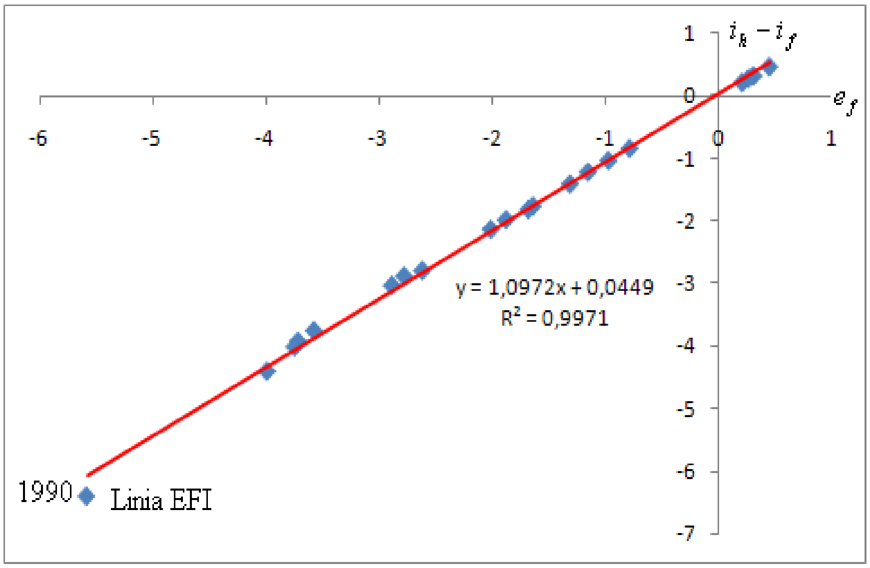

Figure 11. USA – Australia (IFE)

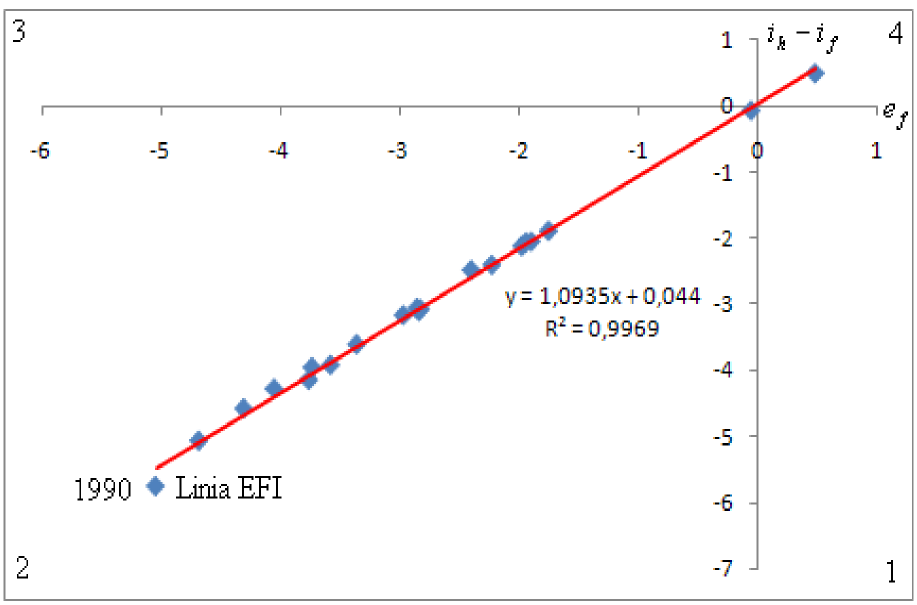

Figure 12. USA – New Zeeland (IFE)

The correlograms that were made for the analysed pair countries provide the first interpretation for the distribution of the points in a system of axes with OX and OY as coordinates. As in the case of the PPP theory, the visual analysis of how the cloud of points was formed gives us important data on the connection between the two variables, the exchange rate and interest rate differential. In order to synthesise how the changes of Y (the exchange rate) are associated with the changes of X (the interest rate differential), we have used “the method of the smallest squares”.

This method tries to find the most suitable line for the analysed data. When the data is represented as points on the graphic and is grouped along the line drawn in the middle, then the distance between the points and the line vary according to the chosen line. The average of the square distances is considered as being a means of perfect fitting to the line. The best line is the one whose square deviation is the minimum. It is desired that the line pass the average (x, y) from the matrix. This is called *the regression line*. Thus, according to the IFE theory, if the points are close to the line, or on the line (for the graphics representing USA – Germany, USA – UK, USA – Canada, USA – Australia and USA – New Zeeland) then the interest rate differential for the analysed period was really influential on the exchange rate. The regression slope for USA – Germany ($y = 1,053x - 0,0683$), USA – UK ($y = 1,1174x + 0,065$), USA – Canada ($y = 1,0838x - 0,0061$), USA – Australia ($y = 1,0972x + 0,0449$), USA – New Zeeland ($y = 1,0935x + 0,044$), points out the following: if the value of β is positive, then the dependence between the two variables is in direct proportion; thus, an increase with a unit in the interest rate differential has determined the appreciation of the foreign currency.

In the case of the IFE theory, the degree of association between the two variables – the exchange rate and the interest rate differential – is given by *the correlation coefficient* (R^2). This coefficient varies between –1 and +1. Thus, the closer the coefficient gets to +1, the stronger the dependence between the two variables. But, when the index tends to –1 the coefficient shows the reverse. However, when it is equal to 0, there is no correlation.

The correlation coefficient (R^2) for the pairs USA – Germany, USA – UK, USA – Canada, USA – Australia and USA – New Zeeland is 0,9956, 0,9981, 0,9986, 0,9971, and 0,9969. The values obtained for these correlation coefficients are very close to +1, which demonstrates the influence of the interest rate differential on the exchange rate.

Among the correlograms for the six pairs there is a distinct one (i.e. USA – Switzerland), whose determination coefficient (R^2) is 0,1515. This value is considered as being too low (it tends towards 0), which indicates the lack of any correlation between the exchange rate and the interest rate differential for the analysed period.

Therefore, all correlograms, except the one for USA – Switzerland, support the IFE theory. They show that short term investment yield abroad is equal to the domestic one. In conclusion, the outcome regarding the interest rate differential is roughly compensated by the exchange rate modification. That is to say that the exchange rate was influenced by the interest rate differential during the analysed period.

3. Conclusions

The foreign exchange market influences many fields of our lives. The impact it has exceeds the sphere of imports and exports and influences the inflation and interest rates, thus having an indirect effect upon our lives. Therefore inflation and interest rates influence the exchange rate, which makes it essential for us to learn how to interpret the information provided by the financial media in order to invest wisely.

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***http://www.imf.org/external/pubs/ft/weo/2010/02/weodata/index.aspx