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Movement of the United States Dollars against selected major world currencies

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***Abstract*—This paper ties to study the trends in major world currencies from 2000 to year 2008. It also shows the movement of the currencies against the United States Dollars. The focus of the investigation also showed which currencies affected movements in the value of the American dollar for the selected years. Time series data was collected though archival sources and data was analysed using regression analysis and Augmented Dickey Fuller test. Results revealed that total variations in the fluctuations in the American dollar was largely caused by some other variables outside the currencies studied. This is based on the purview that data revealed that the movements in the currencies studied could only explain fourty eight percent of total variations in fluctuations in the American dollar. It was also discovered that movements in the British pound had higher impact on fluctuations in the American dollar followed by the Euro and Canadian dollars while the currency with the least impact on the American dollar is the Japanese Yen.**

***Index Terms*—Currencies, dollars, movements, trends**

I. Introduction and Theoretical Issues

Movement in world currencies are a common phenomenon influencing trade balances, inflation, debt size and many governmental policies. Its studies are of great interest to researches and governments since currency movements in either way has great policy implications. It is upon this purview that its studies have aroused the interest of many researchers. The Brandes Institute in 2007 conducted an analysis spanning a period of thirty four years currency data and its potential implications for investor currency hedging programs. They examined the behaviour of currencies over an extended period and issues facing investors who decide to set up a long term currency strategy focussing on developed market currencies. They discovered that currencies exhibited significant volatility in the short term which poses risk to investors who base their hedging decisions on results of 3 to 5 years. They also discovered that data currency floating exchange rates from 1973 to 2006 showed passive hedging programs and have been very costly to United States investors but beneficial to investors in the United Kingdom. They concluded that investors should choose a minimum of ten year benchmark before taking their decisions on hedging on unhedging. Griever, Lee and Wornock (2001) [1] studied the United States system for measuring cross border investment in securities. Kuntara, Levich and Lee(2007) worked on major currency futures contract trading since 1970s.They discovered that the era of easy profits from simple trending of strategies in major currencies are over and that trending may be a feature confined to currencies in early years.[2] Jylha, Lyytinen and Suominen (2008) studied arbitrary capital and currency carry trades returns [3]. Fama (1984) in his own work researched on forward and spot exchange rates.[4] while Sorensen (2001) studied the continuous time mode of the dynamic behaviour of exchange rates. They also investigated fundamental macroeconomic factors that can explain short and long run behaviour of filtered shadow exchange rates.[5] Two other works were cited by Rangvid (2005). The first one focused on analyzing currency crisis within the framework of generation models. The results of the study showed that currency crisis can occur even when there is no secular trend in economic fundamentals.[6] The second work focused on analyzing the convergence of ERM currencies and found strong evidence of convergence in the first and last years of the ERM period.[7] A synthesis of these works show an absence of works that compare the trends in major world currencies and their movements in relation thy je American dollar. This work is structured to fill this gap in the body of knowledge. In line with the foregoing the following research objectives and hypotheses are formulated to guide the study

II. Research Objectives

1. To identify the degree of impact of Canadian dollar on fluctuations in the United states dollar
2. To identify the degree of impact of Euro on fluctuations in the United states dollar
3. To identify the degree of impact of Indian Rupees on fluctuations in the United states dollar
4. To identify the degree of impact of Chinese Yuan on fluctuations in the United states dollar
5. To identify the degree of impact of Japanese Yen on fluctuations in the United states dollar
6. To identify the degree of impact of United Kingdom pounds on fluctuations in the United states dollar

A. Research hypotheses

The following null hypotheses are formulated to guide the study

HO1: Canadian dollars does not impact significantly on fluctuations in the United states dollar

HO2: Euro does not impact significantly on fluctuations in the United states dollar

HO3: Indian Rupees does not impact significantly on fluctuations in the United states dollar

HO4: Chinese Yuan does not impact significantly on fluctuations in the United states dollar

HO5: Japanese Yen does not impact significantly on fluctuations in the United states dollar

HO6: United Kingdom pounds does not impact significantly on fluctuations in the United states dollar

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TABLE 1: RAW DATA ON CURRENCY FLUCTUATIONS FROM 2000 TO 2008

	CAD Canada Dollars		EUR Euro		China Yuan		INR India Rupees		JPY Japan Yen		GBP United Kingdom Pounds	
year	Units per USD	USD per Unit	Units per USD	USD per Unit	Units per USD	USD per unit	Units per USD	USD per Unit	Units per USD	USD per Unit	Units per USD	USD per Unit
2000	1.44590	0.69161	0.99472	1.00530	8.2795	0.1207	43.44000	0.02302	102.140000	0.00979	0.61892	1.61570
2001	1.49920	0.66702	1.06222	0.94140	8.267	0.121	46.62000	0.02145	114.35000	0.00874	0.66997	1.49260
2002	1.59290	0.62778	1.12825	0.88632	8.277	0.120	48.26000	0.02072	131.67000	0.00759	0.68752	1.45450
2003	1.57600	0.63451	0.95347	1.04880	8.277	0.120	47.99500	0.02083	118.77000	0.00841	0.62127	1.60960
2004	1.29340	0.77315	0.79390	1.25959	8.277	0.121	45.59500	0.02193	107.24230	0.00932	0.56000	1.78570
2005	1.20434	0.83032	0.73879	1.35355	8.277	0.121	43.39500	0.02304	102.57999	0.00974	0.52098	1.91945
2006	1.16480	0.85851	0.84449	1.18414	8.07	0.124	44.95000	0.02224	118.12500	0.00846	0.58126	1.72040
2007	1.16570	0.85785	0.757775	1.31969	7.186	0.128	44.11000	0.02267	119.03000	0.008401	0.51044	1.95990
2008	0.99770	1.00230	0.68536	1.45907	7.304	0.137	39.41000	0.02537	111.76000	0.00894	0.503475	1.986195
2009	1.21889	0.820413	0.71569	0.56605	6.826	0.147	48.75643	0.02051	91.07000	0.01098	0.68989	1.44949
2010	1.05204	0.95052	0.69766	1.43335	6.828	0.146	46.61000	0.02145	93.02752	0.01074	0.61850	1.61680

Source "XY Currenc

III. RESULTS OF REGRESSION ANALYSIS

TABLE 2: CANADIAN DOLLAR

Dependent Variable: USD
Method: Least Squares
Date: 06/28/10 Time: 16:04
Sample(adjusted): 2000 2010
Included observations: 11 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.388844	0.724458	8.818785	0.0000
CA	-2.022794	0.554359	-3.648890	0.0053
R-squared	0.596673	Mean dependent var		3.775602
Adjusted R-squared	0.551859	S.D. dependent var		0.541232
S.E. of regression	0.362319	Akaike info criterion		0.970383
Sum squared resid	1.181476	Schwarz criterion		1.042727
Log likelihood	-3.337105	F-statistic		13.31440
Durbin-Watson stat	2.078336	Prob(F-statistic)		0.005327

The results of the regression analysis was done with Canadian dollar as the independent variable. The Durbin Watson statistics value of 2.07 and the Akaike info criterion value of 0.97 and the Schwarz criterion value of more than 0.5 all show that the data is not spurious. Data shows that the R squared lies between 0 and 1. Data from table 2 shows that it explains 59 percent of the variation in United States dollars. The value of F statistics is high at 13.31 and the Prob.(F = statistic is less than 0.05 shows that significance of the parameter Canadian dollar in the model. Hence the first null hypothesis of the study is rejected which states that there is no significant difference between increases in the Canadian and United States Dollars. Data from the coefficient shows that a one unit increase in Canadian dollars decreases United States Dollars by 2 %

The results of the regression analysis was done with Euro as the independent variable. The Durbin Watson statistics value of 2.41 and the Akaike info criterion value of 1.23 and the Schwarz criterion value of more than 1.30 in table 3 all show that the data is not spurious. Data shows that the R squared lies between 0 and 1 as its value is 0.47. Data from table 3 shows that it explains 47 percent of the variation in United States dollars. The value of F statistics is high at 8.81 and the Prob.(F = statistic is less than 0.05 shows that significance of the parameter Euro in the model. The probability value of 0.00 show the high significance of the Euro parameter. Hence the second null hypothesis of the study is rejected which states that there is no significant difference between increases in the Euro and United States Dollars.

TABLE 3 :EURO

Dependent Variable: USD
Method: Least Squares
Date: 06/28/10 Time: 16:07
Sample(adjusted): 2000 2010
Included observations: 11 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.797914	0.720989	8.041612	0.0000
ER	-2.373524	0.833438	-2.847871	0.0192
R-squared	0.474003	Mean dependent var		3.775602
Adjusted R-squared	0.415559	S.D. dependent var		0.541232
S.E. of regression	0.413765	Akaike info criterion		1.235930
Sum squared resid	1.540815	Schwarz criterion		1.308275
Log likelihood	-4.797615	F-statistic		8.110372
Durbin-Watson stat	2.417436	Prob(F-statistic)		0.019156

TABLE 4: INDIAN RUPEE

Dependent Variable: USD
Method: Least Squares
Date: 07/08/10 Time: 09:29
Sample(adjusted): 2002 2010
Included observations: 9 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.320708	2.431162	1.777219	0.1259
ID(-2)	0.049192	0.055946	0.879267	0.4131
R-squared	0.583349	Mean dependent var		3.868143
Adjusted R-squared	0.444465	S.D. dependent var		0.557061
S.E. of regression	0.415201	Akaike info criterion		1.341093
Sum squared resid	1.034351	Schwarz criterion		1.406834
Log likelihood	-3.034918	F-statistic		4.200262
Durbin-Watson stat	2.587712	Prob(F-statistic)		0.072330

The results of the regression analysis was done with the Indian Rupee as the independent variable. Data shows that the R squared lies between 0 and 1 as its value is 0.58 and the Durbin Watson value is 2.58 when the variable was lagged to two periods. Data from table 4 seemingly shows that it explains 58 percent of the variation in United States dollars but the value of F statistics is 4% and the Prob.(F = statistic is higher than 0.05 which shows the non significance of the parameter Indian Rupee in the model. The probability value of 0.07 show the non significance of the Indian Rupee parameter in explaining fluctuations of the United States Dollar. Hence the third null hypothesis of the study is accepted which states that there is no significant difference between increases in the Indian Rupee and United States Dollars. Data shows that increases in one unit of the Indian Rupee increases the United states dollar by a very low value of approximately 0.05 from the coefficient value.

TABLE 5: CHINESE YUAN

Dependent Variable: USD
Method: Least Squares
Date: 07/08/10 Time: 09:21
Sample(adjusted): 2001 2010
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.068417	1.743112	2.333996	0.0523
CY(-1)	0.410391	0.279600	1.467777	0.1856
R-squared	0.680086	Mean dependent var		3.806550
Adjusted R-squared	0.588682	S.D. dependent var		0.560156
S.E. of regression	0.359250	Akaike info criterion		1.033731
Sum squared resid	0.903426	Schwarz criterion		1.124507
Log likelihood	-2.168656	F-statistic		7.440449
Durbin-Watson stat	2.800309	Prob(F-statistic)		0.018519

Data from Table 5 shows that the Durbin Watson statistics value is adequate at 2.8 and the value of the F statistics is 7.44 from table 5. However it could be seen that the fourth hypothesis of the data can be rejected which states that the Chinese Yuan does not impact significantly on the United States dollar. This is based on the fact that the analysis of data reveals that the t statistic is up to 2 and the probability value from table 5 is 0.05 hence it is significant. Data shows that an increase in one unit of Chinese Yuan causes a 0.41% increase in the United states dollar. However since the probability is up to 0.05 it shows that the series is normally distributed. The R squared value of 0.68 shows that it explains 68 % variations in the United States dollars.

TABLE 6: JAPANESE YEN

Dependent Variable: USD
Method: Least Squares
Date: 07/08/10 Time: 09:35
Sample(adjusted): 2001 2010
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.712456	1.658625	3.444092	0.0108
JY(-1)	0.000965	0.013837	0.069775	0.9463
R-squared	0.455124	Mean dependent var		3.806550
Adjusted R-squared	0.299445	S.D. dependent var		0.560156
S.E. of regression	0.468846	Akaike info criterion		1.566239
Sum squared resid	1.538714	Schwarz criterion		1.657014
Log likelihood	-4.831194	F-statistic		2.923474
Durbin-Watson stat	2.432641	Prob(F-statistic)		0.119411

The results of the regression analysis was done with the Japanese Yen as the independent variable. Data shows that the R squared lies between 0 and 1 as its value is 0.455. Data from table 6 shows that it explains approximately 0.46 percent of the variation in United States dollars. The value of F statistics is 2.92 and the Probability value is 0.01 while the t statistics is 3.44 which is higher that 2. This shows the significance of the parameter Japanese Yen in the model . Hence the fifth null hypothesis of the study is rejected which states that there is no significant difference between increases in the Japanese Yen and United States Dollars. The Durbin Watson value when the variable is lagged to one period is 2.43. Data shows that increases in one unit of the Japanese Yen increases the United states dollar by 0.001% from the coefficient value in Table 6.

TABLE 7: UNITED KINGDOM POUNDS

Dependent Variable: USD
Method: Least Squares
Date: 07/08/10 Time: 09:32
Sample(adjusted): 2001 2010
Included observations: 10 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.380681	1.300127	4.138580	0.0044
ER	-2.639750	1.131367	-2.333240	0.0524
UKP(-1)	1.068706	2.474297	0.431923	0.6788
R-squared	0.468899	Mean dependent var		3.806550
Adjusted R-squared	0.317156	S.D. dependent var		0.560156
S.E. of regression	0.462881	Akaike info criterion		1.540632
Sum squared resid	1.499812	Schwarz criterion		1.631407
Log likelihood	-4.703160	F-statistic		3.090084
Durbin-Watson stat	2.194985	Prob(F-statistic)		0.109174

Data from Table 7 show that the United Kingdom pounds from its R squared value of 0.46 and adjusted R-squared value of 0.31 implies that it explains about 40% variation of the fluctuation in the United States dollars. The t statistic value of 4.13, the probability value of 0.00 shows some degree of impact of fluctuations in United Kingdom pounds on the United States dollars which can lead one to reject the sixth hypothesis of the study which states that there is no significant difference of fluctuations in the United Kingdom pounds on the United States dollars. One unit increase in United Kingdom pound decreases the United States dollars by 2.6 % hence it has a higher impact on fluctuations on the United states dollars than other currencies studied while the Japanese Yen had the least impact.

TABLE 8: AUGUMENTED DICKEY FULLER

ADF Test Statistic	-1.544025	1% Critical Value*	-4.4613
		5% Critical Value	-3.2695
		10% Critical Value	-2.7822

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(USD)
Method: Least Squares
Date: 06/28/10 Time: 16:20
Sample(adjusted): 2002 2010
Included observations: 9 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
USD(-1)	-0.787125	0.509788	-1.544025	0.1735
D(USD(-1))	-0.169176	0.448774	-0.376975	0.7192
C	3.058140	1.945636	1.571795	0.1671
R-squared	0.486425	Mean dependent var		0.102961
Adjusted R-squared	0.315233	S.D. dependent var		0.765071
S.E. of regression	0.633101	Akaike info criterion		2.184829
Sum squared resid	2.404904	Schwarz criterion		2.250571
Log likelihood	-6.831731	F-statistic		2.841400
Durbin-Watson stat	2.135726	Prob(F-statistic)		0.135461

The results of the Augumented Dickey Fuller shows that the Durbin Watson statistics is adequate at a value of 2.13 from table 8. The Akaike info criterion shows a high value of 2.18 and the Schwarz criterion is also adequate at a value of 2.25. The R squared value of 0.48 implies that the currencies studied can only explain 48% of the total variations in fluctuations in the United States dollar. Hence fluctuations in the currencies studied do not have a strongly established impact on fluctuations in the United States dollars which is evidenced from the high probability values of 0.17 and 0.135 value for the Prob (F statistic).

In summary, this paper has focussed on the impact of six major currencies on fluctuations on the Unites States dollar. Time series data was collected and six research questions and hypotheses guided the study. Data was analysed using regression analysis Augmented Dickey Fuller test. It was discovered that though the currencies have some degree of impact, such impacts are not quite strongly established as their movements can only explain 48 percent of the fluctuations in the United States dollars. Out of all the currencies the British pounds had the highest impact on fluctuations in the American dollar followed by the Euro and then the Canadian dollar than other currencies. Those with the lesser impacts are the Indian Rupee and the Chinese Yuan while the Japanese Yuan has the least impact on fluctuations in the United States dollar.

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