International Journal of Research in Business Studies and Management
Volume 2, Issue 4, April 2015, PP 38-49
ISSN 2394-5923 (Print) & ISSN 2394-5931 (Online)

The Influence of Exchange Rate Fluctuations on US Outward FDI

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ABSTRACT

This paper makes a contribution to the literature on the effects of uncertainty of exchange rates over the foreign direct investment (FDI) decisions of US firms. The purpose being to find out what influence fluctuations of the value of a currency and the volatility of the exchange rates has on the level of US outward FDI. The focus is on the value of the home country currency in relation to host country currency and the level of exchange rate volatility; this is done by adopting the model by Pantelidis & Kyrkilis (2003, 2005), to this one additional independent variable is included, namely exchange rate volatility which was not used in their model. Based on the multiple correlation analysis, the findings revels a significant relation between the change in currency value (ER) and change in US outward FDI. Moreover the relation between volatility (ERVL) and change in US outward FDI is also significant.

Keywords: foreign exchange rate, foreign direct Investment, foreign exchange rate volatility,

INTRODUCTION

The world has experienced a dramatic increase in the flow of transnational investments ever since the early 1980s. Total world outflows of capital in that decade grew at an average rate of almost 30%, more than three times the rate of world exports at that time, with further growth experienced in the 1990s (Kosteletou and Liargovas, 2000). "While international trade has doubled, flows of foreign direct investment (FDI) have increased by a factor of 10" (Yeyati, Panizza and Stein, 2007) This trade flow, and particularly in this case outward FDI, is being influenced by number of factors including the growth of foreign exchange rate market.

The Bretton Woods system was a negotiated monetary order to govern monetary relations among independent nation-states. The Bretton Woods system was a monetary system of fixed exchange rates against the US dollar. Since the collapse of the Bretton Woods system, many exchange rates are floating against each other. Due to this private and non private sectors have to deal with uncertainty in exchange rates. This uncertainty can be distinguished in two kinds, uncertainty of the value of the currency against another currency and uncertainty about the fluctuation pattern. The purpose of this paper is to find out what influence fluctuations of the value of a currency and the volatility of the exchange rates has on the level of US outward FDI.

Although currency value and exchange rate volatility are related to each other, for this research the distinction is highly important. The value of a currency can increase or decrease (i.e. appreciate or depreciate). This is also known as an exchange rate valuation effect. It is the link between value of the currency and both flow and prices of cross-border acquisitions (Dewenter, 1995). Some currencies have a stable value; other currencies are highly spread out. This is known as exchange rate volatility. According to Olumuyiwa (2003) the exchange rate volatility refers to some measure of the range of the rate over some period of time. The higher the volatility, the more unpredictable the value of currency, and in the end the higher the risks for companies when they invest in a country with a high

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volatile currency.

Besides the two variables, currency value and exchange rate volatility, other determinants could have an effect on outward FDI. These variables too are taken into account, although this is not the main focus of this paper. We would like to make our contribution to the literature on the effects of exchange rate uncertainty on investment decisions by the MNCs. The paper makes this by answering the following question;

"Does the value of the US dollar in relation to the host country currency and exchange rate volatility have a significant influence on outward FDI from the United States?"

Thus this paper will focus on outward FDI; US direct investors investing abroad. The reason for choosing the United States as a home country is based on two considerations. First, the US ranked first concerning outward FDI during the years 1980-2002 (UNCTAD, 2003). More recent data, ranked on home economy, was not available. Second reason is a practical reason, most databases gives values measured in US dollar. Using United States as a home economy lowers the risks of calculating mistakes due to recalculations. The paper is organized as follows. Following is the reviews existing literature on the impact of exchange rate movements and volatility. In section two, I introduce the hypotheses. Section three is a combination of the research design. The section ends with the information concerning the methodology. Section four provides an overview of the data analysis. Section five concludes, and derives the solution of the model and illustrates the results.

LITERATURE REVIEW

There have been diverse literatures on the issue of exchange rate fluctuation as it relates to the decisions taken by investors with respect to foreign direct investment. This paper discuss this in two dimensions; first the impacts of appreciation and depreciation of a currency on FDI and second, the effects of exchange rate volatility on FDI (especially outward FDI the main concern of this paper). In their empirical literature review, Kiyota and Urata (2004) made a clear demarcation between studies dealing with the relation between exchange rate levels and the flows of international investments on one hand, and on the other hand on studies focusing on exchange rate volatility.

The former indicates that Outward Foreign Direct Investment is negatively related to the appreciation of the FDI host country's currency but positively related to the appreciation of the FDI home country's currency. Matteo and Miller (2001) found out that there is strong empirical evidence to the fact that the appreciation of Sterling Pound reduced FDI into the UK. What can be seen here is that for an investor interested to invest in UK, the investment costs in UK becomes higher with the appreciation of the Sterling pound. What this would imply is therefore that, a devaluation of the FDI host country's currency in relation to the potential investor's currency will have a different effect. Kyrkilis and Pantelidis, (2003) argues that the appreciation of the FDI home country's currency has a positive effect on outward FDI. They argue basing on the fact that such an appreciation of the FDI home country's currency lowers the capital requirements of foreign investments in FDI home country's currency units. If such a firm is investing abroad, it will be easier to raise capital than if it could be for the case of depreciated home currency. It will be cheap for such a company to buy investments in counties with currency of less value compared to the FDI home country. Investment setting costs as well as production costs will be relatively cheap. FDI home country's currency appreciation diminishes the level of country's exports competitiveness and thus in order to serve the foreign markets the best mode would be to go for outward FDI. This will be true as well for the case of a depreciation of the FDI host country's currency; if FDI host country's currency depreciates relative to FDI home country's currency, outward FDI is expected to increase.

Different from the above explained relation, not only there are very few studies that focus on the

impact of the exchange rate volatility on the level of outward FDI, but also they are ambiguous as they do not give a clear cut conclusion. The earlier studies by Cushman (1985, 1988) investigated Outward FDI from the United States to countries like Canada, France, Germany, Japan and the United Kingdom for the years between 1963 and 1978. Cushman found that there is a positive relation between outward FDI and exchange rate volatility. Cushman makes a premise that outward FDI is an alternative to exports if there is a strong uncertainty on exchange rates; this will only be the case if the investor's intention is to sell in the local market, in that particular FDI hosting country, and not for export. This is because the volatility in exchange rate in this case will be avoided if the company sells in the local market where production takes place, and hence using only one currency thus avoiding any dealings with exchange rates. This will therefore mean that an investor will refrain to do so if his aim is to re export his productions. Kimino, et al (2007) supporting this line of argument finds the level of multinational activities in Japan increased as the exchange rate variability of investing countries' currencies rose relative to the Yen. In the same line explained above, this is due to the fact that engaging in market seeking FDI becomes an alternative for exports when the volatility on exchange rates increases.

Contrary to these studies, there are studies that find that exchange rate volatility is negatively related to the number of foreign investments from one country to the other, the main point being the uncertainty in operations trends. In their paper, Apergis and Kyrkilis (2002) examining the impact of exchange rate uncertainty on foreign direct investment flows from EU countries into Greece, found that exchange rate uncertainty had a negative impact on Foreign Direct Investment inflows from EU countries. These implied investors could not be exposed to stable profits from their investments because the operating environments for their investments are uncertain, in which case this is expected to discourage any rational investor who would be considering investing there.

Besides, exchange rate levels and exchange rate volatility, FDI outflow of US, just as for any country can be determined by various factors. This would include interest rate of the FDI home country, the GDP level of the FDI home country, technology and human capital, (Pantelidis & Kyrkilis (2003, 2005), and openness of the economy, (Onyeiwu, 2004). The factors that will be attractive to the FDI recipients' countries should not be left out in this consideration, though this is out of the scope of this paper.

Hypotheses

A higher value of the FDI home country's currency (US dollar) against the value of the FDI host country currency will increase the level US outward direct investments to that specific host country. Thus;

H1: The more the value of the US Dollar appreciate against a host country currency, appreciate, the more the US outward FDI will increase.

The literature is not clear about the influence of exchange rate volatility on the level of outward FDI. On the one hand, outward FDI is a substitute for exports if there is a strong uncertainty on exchange rates (Cushman; 1985, 1988). This implies that exchange rate volatility has a positive influence on outward FDI. On the other hand, the higher the volatility of host country currency, the more unpredictable the value of currency at a specific moment in the future, the more unpredictable the value of investments, future cash flows and profit. So a high volatility of the exchange rate would imply a higher risk for investors (Apergis and Kyrkilis, 2002). This would imply that exchange rate volatility has a negative influence on outward FDI. Taking both sides into account, the second hypothesis is as follow:

H2: Exchange rate volatility of a host country currency could have a negative and positive influence on US outward FDI.

METHODOLOGY

The paper takes the research done by Pantelidis & Kyrkilis (2003, 2005) as a starting point. The purpose of their research in 2003 was to test the hypothesis that outward foreign direct investment was determined as a function of home country specific characteristics. According to Pantelidis & Kyrkilis the level of outward FDI is determined by the long-term interest rate of home country (R), the level of income in the home country (YPOP), the level of technology (PAHU), the exchange rate (ER), the openness of the home economy (OPY) and human capital (HUN).

In the research of 2003, Pantelidis & Kyrkilis tested the model underneath by using data for five European Union member states and four non-European member states. In the research published in 2005, Pantelidis & Kurkilis did a cross country analysis by using the same model but then dividing the data of 25 countries into three groups; advanced countries, middle income countries & developing countries. For the advanced country group they found a significant relationship for all variables, and for the two other groups they found a significant relationship for the interest rate (R), Openness (OPY) and income (YPOP). They tested their hypothesis empirically by the econometric application of the next model:

$$FDI = f\,(\underset{-}{R},\ \underset{+}{YPOP},\ \underset{+}{PAHU},\ \underset{+}{HUN},\ \underset{+}{ER},\ \underset{+}{OPY})$$

The signs underneath the variables indicate the expected correlation between the dependent and independent variable. The proposed positively relation between exchange rate value (ER) and outward FDI is expensively described in the literature review. The study of Yeyati, Panizza and Stein (2007) examines the effect of interest rate cycles (R) of the home country in relation to the FDI outflow of these countries to host economies. The study found that as interest rate cycles increased in US and Europe, the outward FDI declines. Thus home countries interest rate (R) should be negatively related to the level outward FDI of the same country. Pantelidis & Kyrkilis (2003, p828) state that: "as the income of a country rises, its economic structure changes and so does the mix of the country's competitive advantages." The relative importance of the manufacturing and services sector in GDP will rise and production will increase. This will lead to more production and markets grow and later on more differentiated production. Economies of scale and improving marketing expertise will lead to competitive advantages.

To gain from their knowledge acquired in the home country, companies will export their knowledge through direct investments abroad. Thus a higher income level (YPOP) is expected to be related with a higher level of outward FDI. According to the same authors technology and human capital are two other determinants of outward FDI. Both factors have to do with competitive advantages. Technological developments and the level of human capital will increase the level of competitiveness compared to other firms. Thus the expected relationship between, on the one side, human capital (HUN) and technological knowledge PAHU and on the other side outward FDI is positive. Onyeiwu (2004) argues that home economies higher degree of openness (OPY) will positively influence the outward FDI of that particular country. A liberalized and export oriented economy will invest more abroad.

The dependent variable is the level of outward FDI. Pantelidis & Kyrkilis didn't use exchange rate volatility (ERVL) as an independent variable in their model. So, this paper extend the model of Pantelidis & Kyrkilis with one additional variable, namely ERVL. The other independent variable is the value of the exchange rate (ER). The control variables are the long-term interest rate of home country (R), the level of income in the home country (YPOP), the level of technology (PAHU), the openness of the home economy (OPY) and human capital (HUN). In conclusion, the following regression model will be used. The signs underneath the variables indicate the expected correlation

(negative or positive) between the independent and the dependent variables.

FDI = *f* (ER, ERVL, R, YPOP, PAHU, HUN, OPY)

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Measurement

The research revolves around the level of outward FDI of the United States. Data are drawn from a sample of the most important host countries in view of the US, that is, the countries with the highest level of direct investment from the United States. The sample is based on the year 2006. A threshold of 10 million dollar is adopted, for countries under this threshold it would be difficult to measure changes. The original sample consisted of the countries Bermuda, Luxembourg and Bahamas. These are excluded from the sample because the outward FDI for these countries might be highly influenced by capital flows because of the tax system in these countries. Moreover the Bermuda dollar is pegged to the dollar. So in any case the fluctuations in US outward FDI to Bermuda are not caused by the exchange rate fluctuations. Based on the World Bank classifications the sample is divided into two groups: high income countries, middle income countries. (See table 1) Because of this distinction Taiwan and Hong Kong are removed of the sample. Reason is that both countries were mentioned separately in the outward FDI data source, although formally they belong to China. (Worldfactbook). Moreover, Hong Kong is indicated as a 'high income' country and China as a 'lower middle income' country. Simply adding up the value of outward FDI for both countries is therefore not possible.

Table1. *High and middle income countries*

High income countries	Middle income countries
Canada, Australia, Austria, Belgium, France, Germany, Ireland, Italy, Japan, Republic of Korea, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom	China, Indonesia, Argentina, Brazil, Chile, Malaysia, Mexico, Russia, Venezuela

At the first place the model is applied to the whole sample. Besides, the model is applied to both groups individual. Exchange rate volatility (ERVL) is measured on a yearly basis per country. It is calculated by taking the daily exchange rate (source: www.oanda.com/convert/fxhistory) in the specific year and calculating the mean and the standard deviation. The standard deviation is the measurement of the volatility of the specific currency in that specific year. Before adjustments, there was a large variation between the different standard deviations among the different currencies. For example, in 2001 the Indonesian Rupiah had a mean of 10,293 rupiah per dollar and a standard deviation of 820. In the same year, the British Pound had a mean of .694 pound per dollar and a standard deviation of .012. In order to compare the different standard deviations, the standard deviations were divided by the mean.

The average yearly exchange rate per country is calculated by taking the mean of the daily exchange rates in the year. In our analysis we will use the exchange rates are used as two different values, a level measure and a growth measure. For the measure of the exchange rate level, the exchange rate values are recalculated as an index value. For this variable the year 2006 = 100. Thus, an index value higher than 100 would imply that the US dollar measured against the respective currency has a higher value than in 2006 and a value lower than 100 means a lower value of the US dollar compared to the level of 2006. Moreover, with respect to the countries which adapted the Euro the exchange rates are recalculated before 2001 by using the irrevocable conversion rates for the Euro. As a second measure for exchange rate, the relative appreciation or depreciation of the exchange rate level was calculated compared to the year before.

The annual outward FDI flows are obtained from the Bureau of Economic Analysis, www.bea.gov. These figures are on a historical-cost basis. The figures are adjusted for US inflation. The yearly inflation figures are calculated based on the average of the monthly US inflation figures obtained from

www.inflationdata.com. Like the yearly exchange rate, the outward FDI is used as two different values, a level measure and a growth measure. For the measure of the outward FDI level, the exchange rate values are recalculated as an index value. Again, the year 2006 = 100. As a second measure for exchange rate, the relative appreciation or depreciation of the outward FDI level is calculated compared to the year before.

As stated earlier, other variables of the home country used by Pantelidis & Kyrkilis (2003, 2005) are used as control variables. The US interest rate (R), the level of income in the home country (YPOP) measured by the real GDP per capita of the United States. Like Pantelidis & Kyrkilis, the level of technology (PAHU) is measured by the number of patents issued in the US against the number of total researchers. The human capital supply (HUN) is measured by the number of total researchers measured against the total US population. Finally US openness (OPY) is measured by the level of export plus imports over the US GDP. The yearly average US interest rate is calculated based on the monthly US interest rate figures obtained from www.federalreserve.gov. The source for US real GDP and population is the Energy Information Administration (www.eia.doe.gov). Information about the level of imports and level of exports is adapted from www.bea.gov. The three values are measured against historical exchange rates. In other words, the values are at nominal prices and have not been adjusted to remove the effect of changes in the purchasing power of the dollar. The source of the level of technology and the level of human capital supply is obtained from the OECD's Main Science and Technology Indicators. Unfortunately not all the data about 'Number of triadic patent families' and 'Total researchers' is available for all years under study. "A patent is a member of the patent families only if it is filed at the European Patent Office, the Japan Patent Office and is granted by the US Patent & Trademark Office." (OECD, 2006)

Finally two dummy variables are added. The first dummy variable is in order to measure if there are differences between high income countries and middle income countries and the influence of volatility and currency value on outward US investments. The dummy takes the value of 0 for a middle income country and 1 for a high income country. The second dummy variable is in order to measure if the level of outward FDI is significantly different when the currency of the host country is pegged. This dummy takes the value of 0 if the currency is pegged, and 1 if the currency is floating during the specific year.

EMPIRICAL RESULTS

As explained earlier, in order to compare the exchange rate volatility (ERVL) by the different standard deviations, the standard deviation is divided by the mean and for readability reasons the values are multiplied by 1,000. These figures are presented in appendix III. Thus, a value of 50 would imply that the standard deviation is 5% of the mean value. And so, when the outcome of these calculation is lower than 1, the volatility of the currency is less than .1% of the mean. Knowing this, it is assumed that a specific currency with an adjusted standard deviation lower than 1 was pegged in that specific year. When a currency is pegged, the currency is fixed to another currency and so the level of outward FDI is not influenced by the volatility. Thus the pegged values are removed from the dataset. Moreover, when a currency was pegged for more than 90 days during a year, this volatility value was removed as well, for example the Venezuelan Bolivar in 1994 & 1995. Based on these two characteristics, the volatility values of Chinese Yuan (1992 till 2006), Malaysian Ringgit (1999 till 2006), Venezuelan Bolivar (1994, 1995, 2005 & 2006) and Argentinean Peso (1995 till 2003) are removed from the dataset.

Pearson's Correlation and Descriptive Statistics

The figures in table 2 present the Pearson's correlation analysis and the descriptive statistics. ER value

and FDI value are correlated negatively (r = -.049, n = 354), however the value is insignificant. The ER change and outward FDI change is also negatively correlated (r = - .121, n = 331) this value is significant at a level of 0.05. ERVL and outward FDI level are correlated positively, but insignificantly (r= .067, n = 354). In contrast, ERVL and the outward FDI change is significant negatively related (r = -.117, n = 354)

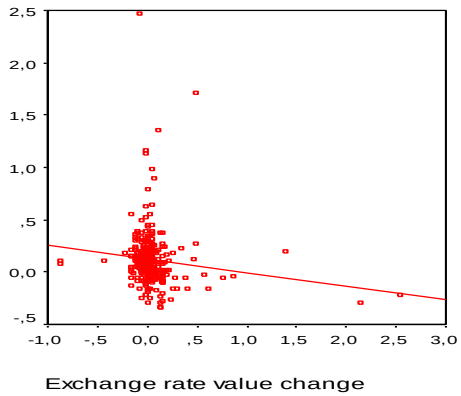
The assumption is that companies don't respond immediately to changes in exchange rates. I assume that the decision making process within a company takes some time. Therefore I compared the values of exchange rate changes with the change in outward FDI values during the next year. For example, an exchange rate change of the year 2000 is compared with the change in outward FDI during the year 2001. This lagged outward FDI measure is indicated as variable 3 in table 2. The relationships between ERVL and the lagged outward FDI is negatively related (r = -.096), the same with ER change and the lagged outward FDI (r = -.043). Both values are insignificant. These values are lower compared to the normal relationship within the year. In addition, the relationships with the 'lagged' outward FDI values are insignificant in contrast to the relationships between the normal outward FDI values. I interpret this as an indication that the decision making process is less than a year. Although, most important, for the further analyses I continue using the normal outward FDI measures.

Multicollinearity

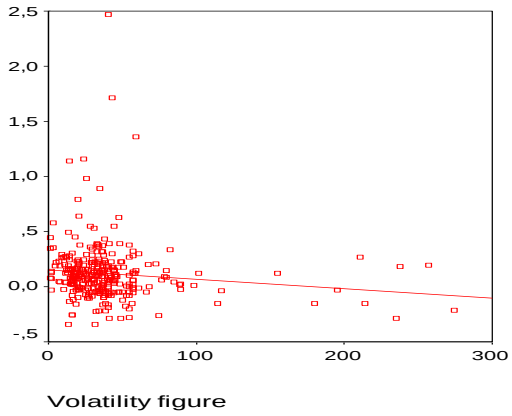
The control variable income is at a significant level (0.01) multicorrelated with human capital (r=.930, n = 217). The human capital (HUN) is removed from the dataset. Another problem is the low amount of useful cases with respect to level of US technology (n = 171). This is because data was not available for all years under study. It might become a problem in the further analysis if different models are compared. Although based on the Pearson's correlation analysis there is no justification to erase this control variable as well.

The scatter plots in graph 1.1 & 1.2 visualize the correspondence between the outward FDI change value and respectively the currency value change (ER, graph 1.1) and exchange rate volatility change (ERVL, graph 2.2).

Scatter Plots



Graph1.1 *FDI versus ER*



Graph1.2 *FDI versus ERVL*

Partial Correlation Analysis

A partial correlation indicates the strength between the independent variables and the independent variables, by holding the other independent variables constant. When the relationships between ERVL and outward FDI and ER and outward FDI are controlled for R, YPOP, OPY, PAHU and HUN the relationships changed. See table 3.

Table3. *Partial correlation analysis (n = 158)*

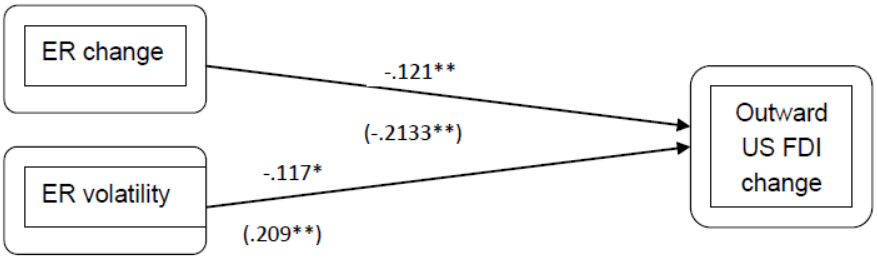
Controlled for: R, YPOP, OPY & PAHU		
	ER volatility	Currency value change
Outward FDI change	-0,2133	-0,209
	P = 0,007	P = 0,008

Controlling for those variables, the relationship between ER value change and outward FDI change becomes more negative (r = -.209). The relationship between ERVL and outward FDI change becomes also more negative (r = -.2133). The number of cases is decreased because of many missing values for PAHU. Therefore a second partial correlation analysis is done without the PAHU control variable, which is presented in table 4.

Table4. *Partial correlation analysis (n = 316)*

Controlled for: R, YPOP, OPY		
	ER volatility	Currency value change
Outward FDI change	-0,1159	-0,131
	P = 0,039	P = 0,019

N has doubled since PAHU was removed. Now the slope for both values is less steep, but the values are still significant. To sum up, the (partial) correlations between 'ER volatility' and 'currency value' on the one hand, and 'Outward FDI change' are visualized in figure 1. The partial correlations are given between the brackets. With these results the first hypothesis can be rejected, opposite significance is found. Based on this sample we found a *negative relation* between appreciations of the US Dollar compared to a FDI host country's currency and the change in US outward investments. Concerning the second hypothesis, we found a significant *negative relationship* between Exchange rate volatility of a host country currency and the change in US outward FDI.



Linear regression analysis

Based on the (partial) correlations and the scatter plots a linear regression analysis is justified. ERVL and ER change are entered in a model with 'Outward FDI change' as the dependent variable, see table 5. Based on these results, no independent variable significantly predicts the level of outward FDI. (F = 2.745, p. =.066) Moreover, this model has a very low explanatory power (R Square = 0.017 & Adj. R Square = .017), and therefore it is a worse prediction of the level of outward US investments.

Table5. *ER and ERVL versus outward US FDI (n = 320)*

Variable	**Beta**	**T ratio**	**Sig.**
ER – Exchange rate value changes	-.086	-1.293	.216
ERVL – Exchange rate volatility	-.060	-.860	.390
R Square = .017 **Adjusted R Square = .011**			

Secondly ER, ERVL and the control variables are included into the model. (See table 6). By using the linear regression method, a model is developed in which ER change, ERVL still not significant related to FDI change.

Table6. *All independent (control variables) versus outward US FDI (n = 163)*

Variable	Beta	T ratio	Sig.
ER – exchange rate value changes	-.127	-1.269	.206
ERVL – exchange rate volatility	.142	-1.382	.169
R – Us interest rate	.029	0.089	.929
YPOP - US income	-.151	-1.202	.231
OPY – Openess of US economy	-.072	-.279	.781
PAHU – Technology of US	-.165	-.738	.461
R Square = .081 **Adjusted R Square = .046**			

Again, the number of cases (n = 163) decreased because of many missing values for HUN and PAHU. Using this model, only 4.6% of the variance of outward US investment changes is explained by these variables. With this model we can explain only 2.3 times more variation (F = 2.301, p = 0.037), than with random sampling. Thus the findings are in sharp contrast to results of the research by Pantelidis & Kyrkilis (2003, 2005). Using their variables, we do not find a sufficient model for explaining the variance in US outward investments.

Host country income level and outward US Investments.

Based on the World Bank classifications the sample is divided into two groups: high income countries, middle income countries. In this part the analysis is done to see if there are differences between high income countries and middle income countries and the influence of volatility and currency value on outward US investments. In order to make this analysis possible a dummy variable was developed.

Table2. *Pearson's correlation matrix and descriptive statistics*

Variables	*N*	*Mean*	*s.d.*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
(1) Outward FDI value (2006 = 100)	346	64,333	30,161										
(2) Outward FDI value change compared to year before	327	0,122	0,261	-0,12*									
(3) Outward FDI value change compared to year before (with Lag of 1 year)	304	0,120	0,270	-,087	0,092								
(4) Volatility value	354	40,791	44,664	0,067	-,117*	-,096							
(5) Exchange rate value	354	101,937	25,012	-,049	-,057	-,094	-,160**						
(6) Exchange rate value change compared to year before	331	0,046	0,260	-,035	-,121*	-,043	,534**	-,223**					
(7) US interest rate	354	6,986	1,631	-,196**	,025	0,081	-0,15	-,171**	,134*				
(8) US income	354	33650	5732	,659**	-,083	-,078	-,047	,249**	-,114*	-,316**			
(9) Openess of US economy	354	0,075	0,007	,513**	-,064	-,015	-,011	,160**	,000	,238**	,762**		
(10) Level of US technology	171	0,012	0,000	-,218**	-,100	-,036	,112	,339**	,187*	,528**	-,467**	-,306**	
(11) US Human capital	217	0,004	0,004	,575**	-,073	-,161	,156*	,349**	-,033	-,423	,931**	,692**	-,632**
* p < 0,05 (two tailed)													
** p < 0,01 (two tailed)													

The dummy takes the value of 0 for a middle income country and 1 for a high income country. In order to find an optimal model, all independent variables are entered in a model by using a stepwise method for both groups separately.

Table7. *Optimal Model High income countries*

Variable entered:		Exchange rate change
R Square:		0,068
Adj. R Square:		0,06
F:		0,005
Excluded variable	T ratio	Sig.
ERVL	-0,193	0,848
R	0,506	0,614
YPOP	-0,356	0,722
OPY	0,202	0,841

For the middle income group we didn't find an optimal model. For the high income group the approach resulted in one model with only 'ER change' as a predicting factor. This model predicts

significantly the expected value of change in outward US investments on significance level of 0.05. See also table 7.

Pegged Versus Floating Currencies and Outward US Investments

As states at the beginning of this chapter, when the outcome of the volatility figure was lower than 1, the volatility of the currency is less than .1% of the mean. Knowing this, it is assumed that a specific currency with an adjusted standard deviation lower than 1 was pegged in that specific year. When a currency is pegged, the level of outward FDI is not influenced by the volatility, so these values are erased from the dataset. However, there were US direct investments in those specific host countries (Appendix I). The higher the volatility of host country currency, the more unpredictable the value of currency at a specific moment in the future, the more unpredictable the value of investments, future cash flows and profit.. Thus, under a pegged exchange rate the investors are surer about their future profit and cash flows. In line with this we expect a higher level of outward FDI to countries with a pegged currency.

Table8. *Levene's Test for Equality of Variances*

	Pegged currencies	Floating currencies
N	19	83
Mean	83,258	73,769
Independent Sample test		
F	0,147	
P	0,703	

In order to make this analysis possible a dummy variable was developed. This dummy takes the value of 0 if the currency is pegged, and 1 if the currency is floating during the specific year. The level of FDI under pegged exchange rates is compared with the level of FDI under floating exchange rates. Only in the group with middle income countries there were pegged currencies during the period under study. So, this analysis is only adapted to group of middle income countries. For this analysis an independent Sample T Test was used to determine if there is evidence that the outward US investments to a host country with a floating or pegged currencies differ. The results are presented in table 8.

These results leads to the acceptance of the Levene's test hypothesis of equal variances. There is no evidence that the outward FDI significantly differs under pegged or floating exchange rates. As well as the other analysis, the number of cases is decreased because of missing values for PAHU.

DISCUSSION AND CONCLUSION

The paper makes a contribution to the literature on the effects of uncertainty of exchange rates over the foreign direct investment decisions of firms in the United States. This is done by testing the effect of uncertainty of exchange rates with two variables; the change in exchange rate value and exchange rate volatility. Based on the multiple correlation analysis there is a significant relation between the change in currency value (ER) and change in US outward FDI (r = -.121). The relation between volatility (ERVL) and change in US outward FDI is also significant (r = -.117). Moreover, when ER change and ERVL are partial controlled for the control variables a steeper and significant model is found. When both variables are used in one model, there is no significant model (F = 2.745).

Based on these results the first hypothesis is rejected. No positive relations are found between the value of the Dollar compared to a host country currency and the US outward FDI but rather a significant opposite, negative relationship. So this might imply that there are other factors which are more important for the determination of US outward FDI. The second hypothesis has been accepted. The negative relationship between the volatility of the host currency related to the US dollar and the outward US FDI is found. High volatility of the exchange rate would imply higher

risks for investors because of unpredictable the value of investments. In other words, a negative relation between exchange rate volatility and the change in outward US FDI would imply that a high volatility is not a reason to invest. In contrast, it is a reason to lower investments overseas.

In addition to the second hypothesis tested if there is a difference between pegged currencies (very low volatility) and floating currencies for middle income countries. I didn't found a significant difference between both groups. This implies that companies aren't attracted to a specific country when the country pegged it's currency to the dollar. This analysis led to interesting results. However, there are some limitations. First of all annual measurement might be too rough to measure fluctuations in currency value and FDI outflows. A quarterly, or even a monthly measurement might be better, but our data source didn't allow this. Secondly, the dependent variable (outward FDI) and all the control variables are measured in sight of one home country, namely the United States.

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http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html

Exchange rate

Available at: www.oanda.com/convert/fxhistory

US inflation data

Available at: http://inflationdata.com/inflation/Inflation_Rate/HistoricalInflation.aspx

US interest rate figures

Available at: *http://www.federalreserve.gov/releases/h15/data.htm*

US real GDP and population

Energy Information Administration

Available at: *www.eia.doe.gov*

Level of imports and level of exports

Available at: http://www.bea.gov/international/index.htm#trade