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# Causality Relations between Foreign Direct Investment and Portfolio Investment Volatility

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## Abstract

Following the liberalization of financial markets, Goldstein and Razin (2006) show that there is an information based trade-off between foreign direct investment and foreign portfolio investment, our paper examines the causality relations between foreign direct investment and volatility of foreign portfolio investment. Utilizing monthly and quarterly data set of Czech Republic, Poland, Russia and Turkey, volatility of portfolio investments, which indicated evidence of ARCH effects for all four countries, have been estimated by best fitting GARCH (p,q) models. Further, potential causality has been examined by Granger (1969), Sims (1972) and Toda and Yamamoto (1995) test methods.

Results indicated that, for Russia and Turkey foreign direct investment has a significant cause on portfolio investment volatility. However for Czech Republic and Poland, there is no such significant relationship has been found. Finally further investigation of a possible structural break due to EU membership could not provide such evidence for Czech Republic and Poland in related variables.

**Keywords:** Foreign Direct Investment, Foreign Portfolio Investment, Eastern Europe, Causality.

## 1. Introduction

Private equity flows in various forms all have positive effect on the performance of the host country. Foreign Direct Investment (FDI hereafter) and Foreign Portfolio Investment (FPI hereafter) are two of the forms of international investment choices. Between the two, FDI is considered as a crucial component especially for developing countries (Albuquerque, 2003). FDI's contribution to domestic investment and output growth dominates over the contributions of FPI flows (Razin, 2002). Literature suggests two main reasons for the preference for FDI. First, it potentially involves creation of new jobs, transfer of foreign technology and managerial expertise, and larger increases in per capita GDP (Strazicich et al. 2001). Second FDI is suggested to be more stable compared to other forms of foreign investment (Bekaert and Harvey, 1998). Borensztein et al. (1998), Balasubramanyam et al. (1996) and Lichtenberg and van Pottelsberghe de la Potterie (1996) are also found these favorable effects of FDI. This characteristic is persistent both during normal and crisis periods (Sula and Willett, 2009).

Nevertheless, although the physical investment is irreversible once made, the flow of funds associated with that investment is not necessarily irreversible (Sarno and Taylor, 1999). Portfolio flows on the other hand consist of liquid assets such as bond and equity investments. That structure of FPIs enables investors to sell their assets more easily and quickly. This makes FPI the primary candidate to be the hottest and the most volatile of all major types of foreign capital flows. Hence, there is vast amount of evidence on the structure and individual behaviors of these two forms of foreign capital. However, to our knowledge not much has been done on the causal relationship between FDI and FPI.

Next section provides a summary of the related literature about the variable and model used. Second section explains the data and the methodology, the third section presents the empirical findings and final section concludes.

## **2. Literature Review**

The standard approach states that more volatile form of capital is the one that is more likely to leave the country. Hence, conventional wisdom suggests that FDI is the least volatile and short-term funds are more volatile than long term funds (Gabriele et al. 2000). Literature provides empirical evidence mostly in favor of this opinion indicating that FDI is unconditionally less volatile than other flows UNCTAD (1998), World Bank (1999) and Lipsey (1999, 2001) and portfolio flows are generally considered the most volatile form of foreign capital flows (Ferreira and Laux, 2009), thus the “hottest” of all (Sula and Willett, 2009). Contrary to this argument Claessens et al. (1995) finds that FDI is as volatile as other types of flows. Levchenko and Mauro (2007) find that while the coefficient of variation for FDI was less than other types of capital flows, its standard deviation is higher than debt and equity portfolio’s and bank flows This phenomenon is valid especially in the emerging markets (Teaser and Werner, 1995) and following policy liberalization (Kraay, 1998). Although, Neumann et al. (2009) suggest that high volume high volatility relationship is persistent on the average flow for both direct investment and portfolio flows for both the mature and emerging countries, comparing the standard deviation of the residuals across countries, Broner and Rigobon (2004) find that capital flows to emerging markets are 80% more volatile than those to mature markets. On the contrary, after investigating as a group of capital flows Bekaert and Harvey (2003) suggest that capital flows to emerging markets are less volatile than developed countries. Neumann et al. (2009) also suggest that the standard deviations of FDI and portfolio flows increase as financial liberalization occur. Bekaert and Harvey (2003) argue that volatility should subside once the large capital inflow has occurred adding that there is always the worry that portfolio flows are not as “sticky” as FDI and may disappear at a whim causing a crisis in the process.

An important indicator of the volatility of a certain type of foreign investment would be the permanent and temporary portions of it. FDI mainly consists of fixed assets. It is highly illiquid, therefore difficult to sell during liquidity crisis. Moreover the driving force behind FDI is long term profitability expectations that are based on the fundamentals of the host country rather than the speculative forces that partially drive relatively shorter term capital flows such as FPI. Sarno and Taylor (1999) argue that the flows that are more likely to have sudden reversals would have large temporary, reversible components. They find that FDI is mostly composed of a permanent component and that FPI flows have a large temporary and reversible component. Moreover, Chuhan et al. (1996) observes that FDI responds less to shocks most likely due to its permanent dominated structure. Lipsey (1999) reports significant differences in volatility between FDI and other net long term flows for developing countries. Thus, we can say that FDI flows are mostly permanent and tend to be more stable whereas FPI displays a temporary dominated and volatile structure.

This structural difference between FDI and FPI is crucial for our model. We construct our model partially based on this unique difference between the structures of two types of foreign investments. Based on the well documented permanent nature of FDI and temporary nature of FPI we model our investigation between FDI measured at level values and the volatility of FPI. Thus, our main

objective is to investigate whether there is causality between FDI and the volatility of FPI in a number of Eastern European emerging economies that are still in the process of capital liberalization. Although one could argue that capital liberalization processes in emerging markets are subject to sudden shocks, shock effects to portfolio investment are temporary (Strazicich et al. 2001). Claessens et al. (1995) finds in general the time it takes for unexpected shocks to dissipate is similar for both FDI and portfolio investment. Therefore, our approach would not be significantly affected by possible shocks during the observation period. Neumann et al. (2009) provide preliminary evidence suggesting that portfolio flows appear to show little response to capital liberalization while foreign direct investment flows show significant increases in volatility, particularly for the emerging markets considered. Thus, if flows chase growth expectations, we should expect capital liberalization to be followed by FDI flow.

We investigate whether initial FDI flow sets up an environment for potential FPI follow up. Literature provides theoretical and empirical evidence for such a causal structure. There is an information based trade-off between foreign direct investment and portfolio investment. FDI enables the owner to obtain refined information about the firm. Foreign direct investor obtains both the ownership and the control of the domestic firm whereas foreign portfolio investor's gain is limited to the ownership. FDI investors are more informed about the prospects and fundamentals of their projects compared to FPI investors (Razin and Sadka, 2003). This effect generates an advantage, with an added value in the capital market, to foreign direct investors relative to foreign portfolio investors (Goldstein and Razin, 2006). However, literature suggests that FPIs are particularly more susceptible to these kind of informational problems and herding behavior (Sula and Willett, 2009). Informational problems can cause rational herding behavior in financial markets (Calvo and Mendoza, 2000). Mutual fund managers show similar patterns in their trading behavior and tend to invest or leave a market at the same time (Haley, 2001). Moreover, this superiority, the "information value" of FDI relative to FPI poses also a problem of asymmetric information between buyers and sellers of investment projects (Ahmad et al., 2004) which is crucial for the order of FDI and FPI entry to a country. As Goldstein and Razin (2006) point out, if a foreign direct investor chooses to liquidate his or her firm for a reason, potential buyers would underpriced the firm assuming that foreign direct investor has an information advantage. Foreign direct investor would have a low resale price because of asymmetric information between the owner and potential buyers. Thus, one implication of this would be that if the investor wants liquidity then he or she would choose less control vice versa. Albuquerque (2003) also argues FDI overcomes imperfect enforcement mechanism providing a risk sharing form of investment. Higher exit cost, due to the difficulty of reselling a firm signals to the following investors, low probability of early liquidation and potential positive return. Thus, we expect that sensitivity of FPI to information and asymmetric information advantage of FDI by its nature would cause capital liberalization in emerging markets to be followed by foreign direct investment flow followed by short term foreign portfolio investment.

### 3. Data and Methodology

This study is based on the monthly FDI and FPI data, date 2000:01-2009:12 for Turkey and Poland and quarterly data for Czech Republic and Russia date 1995:Q1-2009:Q4. The mentioned data are obtained from Central Bank of related markets. Firstly, under null hypothesis variable has a unit root, the unit root tests suggested by (Kwiatkowski et al., 1992) and (Phillips and Perron, 1988) are tested and it is proved that they are not stationary. Therefore time series' first differences are used. Since we have limited space, the obtained unit root tests results are not included in the study. For showing the volatility of FPI, GARCH (p,q) model is used. GARCH models have been introduced by (Engle, 1982) and have been expanded and generalized by (Bollerslev, 1986). The GARCH(p,q) model has been defined by (Bollerslev 1986) as:

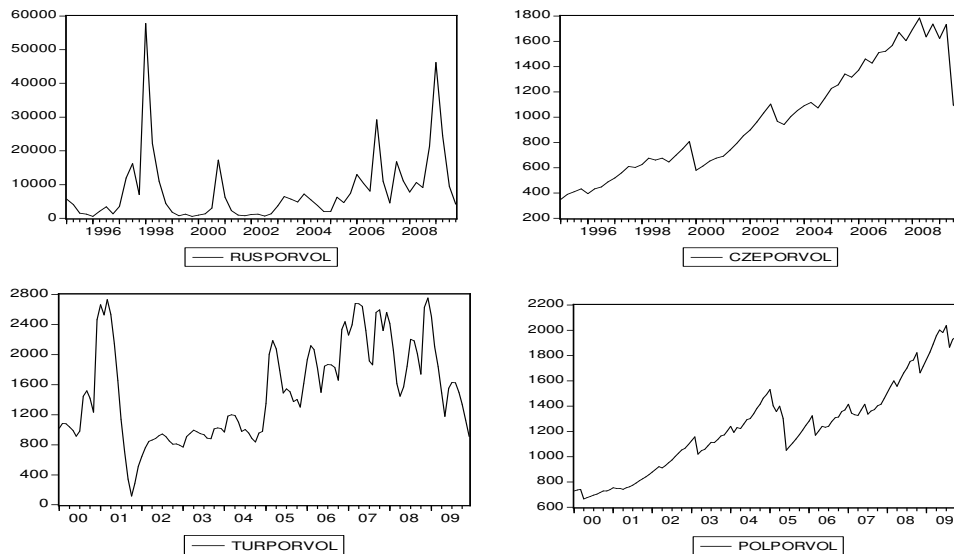
$$h_t = \omega + \sum_{i=1}^p \beta_i h_{t-i} + \sum_{j=1}^q \alpha_j \varepsilon_{t-j}^2 \quad (1)$$

The  $\omega > 0$  condition must exist in this model. Along with this in order for the  $h_t$  value to be positive, it must be  $\alpha \geq 0$  and  $\beta \geq 0$  for GARCH (p,q). Also during the GARCH (p,q) process for the variance to be homoscedastic, the following assumption must exist:

$$\sum_{i=1}^p \beta_i + \sum_{j=1}^q \alpha_j < 1 \quad (2)$$

The main reason this model is used is that it responds quicker to the shocks than do the other models. For testing whether have on ARCH effect, optimum AR(p) and MA(q) process have been selected by Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC). It has been approved that selected AR(p) and MA(q) process have an ARCH effect. At this point it must be explained that in the GARCH (p,q) model the FPI series have been analyzed for autocorrelation. The lag selection is taken as fifteen, the lag number suggested by (Engle, 2001). In order to show that there is no autocorrelation within the series Q statistics can be used, to show that the specification of the variance equation is correct  $Q^2$  statistics can be used, and to show the ARCH effect on the selected lag in the variance equation ARCH-LM test statistics can be used. According to the ARCH-LM test which takes FPI as a basis there is no remaining ARCH effect for both of the variables. Best fitting GARCH (p,q) models selected by Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) are GARCH(1,1) model for Poland, Russia and Czech Republic; GARCH(1,2) model for Turkey. All these results are available upon request. GARCH(p,q) volatility of FPI can be shown as graphs:

**Graph 1: GARCH (p,q) volatility of FPI.**



#### 4. Empirical Findings

Potential pairwise causality has been examined by (Granger, 1969), (Sims, 1972) and (Toda and Yamamoto, 1995) test methods. Under null hypothesis FPI Volatility does not Granger Cause FDI and FDI does not Granger Cause FPI Volatility, all of these results can be shown as in Table 1

Because of limited space, the probability values of causality tests results are only shown in the Table 1. Since FPI Volatility under null hypothesis variable has a unit root, the unit root tests suggested by (Kwiatkowski et al., 1992) and (Phillips and Perron, 1988) are tested and it is proved that Czech Republic and Poland series are stationary and Turkey and Russia series are not stationary. It has been showed that all series are not cointegrated; only pairwise causality tests are used. Since defining the maximum lag of twelve, causality tests lag length selected by AIC and BIC and only up to three lags of results are shown in table. It can be said that up to three lags of causality tests' results, there are 10% and 5% significant causality between FDI and FPI volatility for Turkey and Russia. However, four, six,

eight, twelve lag values for Turkey and twelve lag values for Russia are also significant but these results are not added in the Table 1.

**Table 1:** (Granger, 1969), (Sims, 1972) and (Toda and Yamamoto, 1995) Test Results.

		Lag	Granger (1969)	Sims (1972)	T-Y (1995)
<b>Poland</b>	FPIVOL does not Granger Cause FDI	<b>1</b>	0.5904	0.5668	0.5550
	FDI does not Granger Cause FPIVOL		0.8513	0.8172	0.8002
	FPIVOL does not Granger Cause FDI	<b>2</b>	0.8257	0.7927	0.7762
	FDI does not Granger Cause FPIVOL		0.7960	0.7642	0.7482
	FPIVOL does not Granger Cause FDI	<b>3</b>	0.8016	0.7695	0.7535
	FDI does not Granger Cause FPIVOL		0.4659	0.4473	0.4379
		Lag	Granger (1969)	Sims (1972)	T-Y (1995)
<b>Turkey</b>	FPIVOL does not Granger Cause FDI	<b>1</b>	0.1975	0.1949	0.1892
	FDI does not Granger Cause FPIVOL		0.0634*	0.0609*	0.0576*
	FPIVOL does not Granger Cause FDI	<b>2</b>	0.1715	0.1668	0.1540
	FDI does not Granger Cause FPIVOL		0.1110	0.1063	0.0961*
	FPIVOL does not Granger Cause FDI	<b>3</b>	0.2761	0.2704	0.2437
	FDI does not Granger Cause FPIVOL		0.0288**	0.0247**	0.0188**
		Lag	Granger (1969)	Sims (1972)	T-Y (1995)
<b>Czech Rep</b>	FPIVOL does not Granger Cause FDI	<b>1</b>	0.7348	0.7054	0.6907
	FDI does not Granger Cause FPIVOL		0.8885	0.8530	0.8352
	FPIVOL does not Granger Cause FDI	<b>2</b>	0.8194	0.7866	0.7702
	FDI does not Granger Cause FPIVOL		0.2671	0.2564	0.2511
	FPIVOL does not Granger Cause FDI	<b>3</b>	0.4859	0.4665	0.4567
	FDI does not Granger Cause FPIVOL		0.4118	0.3953	0.3871
		Lag	Granger (1969)	Sims (1972)	T-Y (1995)
<b>Russia</b>	FPIVOL does not Granger Cause FDI	<b>1</b>	0.1667	0.1611	0.1501
	FDI does not Granger Cause FPIVOL		0.0237**	0.02**	0.0169**
	FPIVOL does not Granger Cause FDI	<b>2</b>	0.8788	0.8786	0.8677
	FDI does not Granger Cause FPIVOL		0.1284	0.1182	0.0962*
	FPIVOL does not Granger Cause FDI	<b>3</b>	0.9820	0.9823	0.9785
	FDI does not Granger Cause FPIVOL		0.1237	0.1092	0.0747*

Table shows that rejection of null hypothesis p-values and \*10%, \*\*5% significant.

Furthermore we investigate possible structural break due to EU membership date beginning 2004:05 for Poland and 2004:Q2 for Czech Republic. Up to twelve lag of pairwise (Granger, 1969), (Sims, 1972) and (Toda and Yamamoto, 1995) tests results are shown that EU membership could not provide such evidence for Czech Republic and Poland in related variables. Under null hypothesis FPIVOL does not Granger Cause FDI and FDI does not Granger Cause FPIVOL, for Poland date 2000:01-2004:04 minimum probability values of mentioned tests are 0,6799 for lag one and date 2004:05-2009:12 is 0,4721 for lag three. For Czech Republic date 1995:Q1-2004:Q2, minimum probability values of mentioned tests are 0,1722 for lag two and date 2004:Q3-2009:Q4 is 0,3409 for lag two. All these results are also available upon request.

## 5. Conclusion

The permanent structure of FDI and temporary structure of FPI are well documented in the literature. Literature also suggests that following capital liberalization in an emerging market, relative change in FDI flow is more than change in FPI flow. Thus, literature implies that capital liberalization is followed initially by FDI. Moreover, through signaling potential positive return and optimism about the fundamental indicators due to its permanent structure and informational advantage, FDI somewhat paves the way for FPI that is especially sensitive to lack of informational efficiency. Therefore, we examine whether there exists a casual relationship between FDI measured at level and FPI volatility in a number of Eastern European emerging markets.

Our results indicate that, for Russia and Turkey FDI has a significant cause on FPI volatility. This result also support the argument that FDI which does not require a degree of capital liberalization as much as FPI helps overcoming the informational inefficiency to some extent and leads the entry of foreign investment into these emerging markets. Results reveal no such relationship for Czech Republic and Poland. Further partitioning the observation period between post and pre EU membership reveals no change in results. We believe that there are two possible explanations to this. First, informational asymmetry is not as severe for this group of countries. Second, these two countries have reached a necessary level of capital liberalization at a shorter length of time so FDI could not be a fore runner and cause of FPI.

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