Article

FDI Inflows, Price and Exchange Rate Volatility: New Empirical Evidence from Latin America

Silvia Dal Bianco [1],* and Loan Nguyen Cong To [2]

[1]   Economics, London Metropolitan University, 84 Moorgate, London EC2M 6SQ, UK

[2]   Program Manager, Trade Law & Economic Reform, USAID Governance for Inclusive Growth Program, Chemonics International Inc., Level 6, VID Building, 115 Tran Hung Dao St., Hoan Kiem Dist., Hanoi, Vietnam; Loan.Nguyen@vietnamgig.com

*   Correspondence: s.dalbianco@londonmet.ac.uk

Abstract: This paper investigates the impact of price and real exchange rate volatility on Foreign Direct Investment (FDI) inflows in a panel of 10 Latin American and Caribbean countries, observed between 1990 and 2012. Both price and exchange rate volatility series are estimated through the Generalized Autoregressive Conditional Heteroscedasticity model (GARCH). Our results, obtained employing the Fixed Effects estimator, confirm the theory of hysteresis and option value, in so far it is found a statistically significant negative effect of exchange rate volatility on FDI. Price volatility, instead, turns out to be positive but insignificant. Moreover, we show that human capital and trade openness are key for attracting foreign capital. From the policy perspective, our analysis suggests the importance of stabilization policies as well as the one of government credibility in promoting trade openness and human capital formation.

1. Introduction

OECD (2008) defines a Foreign Direct Investment Enterprise as an incorporated or unincorporated enterprise in which a foreign investor owns 10 per cent or more of the ordinary shares or voting power of an incorporated enterprise or the equivalent of an unincorporated enterprise. Hence, the direct investor is able to influence or participate in the management and it possesses a long-lasting interest in the enterprise.

The benefits of FDI for a recipient country are both direct (e.g. capital and employment) and indirect (e.g. knowledge transfer), see Lipsey (2000) and Bruno and Campos (2013) for exhaustive reviews.

In the last two decades, the world economy has witnessed a number of economic crises as well as macroeconomic uncertainty. Hence, price and exchange rate volatility have characterized the globalized economic environment, see Bloom (2009), Arellano et al. (2012), Caggiano et al. (2014), Aastveit et al. (2013), and Mumtaz and Surico (2013), among many others. Despite the impact of price and exchange rate volatility on FDI inflows has been widely investigated, from both the theoretical and the empirical perspective, the evidence on Latin American and Caribbean countries is still scant. This is quite surprising, given the historic importance of such a region in terms of both resource-seeking as well as efficiency-seeking investment, see UNCTAD (2014) for recent trends and

Dunning (2000) for definitions. Moreover, as according to ECLAC (2013), between 1990 and 2012, FDI inflows did not only steadily increase in Latin America but also their distribution between natural resources, manufacturing and services has not shown signs of dramatic structural change.

Starting from these observations, the aim of the present work is the empirical assessment of the impact of price and exchange rate volatility on FDI inflows in 10 selected Latin American and Caribbean countries, observed between 1990 and 2012. In particular, the countries here considered are Brazil, Chile, Paraguay, Uruguay, Mexico, Costa Rica, Nicaragua, Dominica, Dominican Republic and Trinidad and Tobago.

The choice of the countries is dictated by the use of volatility modeling through Generalized Autoregressive Conditional Heteroscedasticity techniques (see Paragraph 4 for full details). The time span of the study, instead, has been selected in order to include the effects of the 2007-2008 financial crisis but not the ones of oil prices' drop. As a matter of facts, the great recession in the selected economies came to an end by 2012 (see for more details Dal Bianco et al., 2016) while the oil prices began to decrease in the same year. The extension of the sampled period, together with further analysis, is left for future research (see Paragraph 3 for details).

The main contribution of the present work is to provide some novel empirical evidence on the impact of price and real exchange rate volatility on FDI inflows in Latin American countries.

The signs of such effects have been lengthily debated. Two main theoretical views have emerged: first, the production flexibility argument and, second, the theory of hysteresis and option value. According to the first one, if the purpose of foreign investors is not to export abroad or re-export but rather to take advantage of production flexibility, macroeconomic uncertainty should boost FDI flows. According to Abel (1983), output price uncertainty increases investment for risk-neutral competitive firms, which face convex costs of adjustment. Cushman (1985) reaches the same conclusion, analyzing the pattern of foreign investment, arguing that in response to appreciation risk, Multinational Enterprises (i.e. MNEs) reduce exports to the foreign country but they offset the decrease in export increasing foreign capital input and production.

On the other hand, the theory of hysteresis and option value implies a negative sign of uncertainty impact on FDI due to high sunk cost, which further delays investment. Dixit and Pindyck (1994) show that the intrinsic irreversibility of FDI due to a large sunk cost and tendency to delay due to ownership advantage widens "Marshallian zone of inaction". Under the assumptions of uncertainty and irreversible investment, the real- option theory emphasizes the option value of the flexibility that a firm has in possibly delaying an investment decision in order to obtain more information about the future. Bernanke (1983) asserts that in the presence of uncertainty regarding the effectiveness of the macroeconomic policies, rational agents will withhold their investment decision (considering that these investments are either completely or partly irreversible) until the uncertainty is removed. If it is assumed that investors are risk averse as opposed to risk neutral then the overall effect of uncertainty on investment may be negative, Zeira (1990). Dixit and Pindyck (1994) indicate that the waiting value increases as the uncertainty rises even for a risk-neutral firm. Hence, uncertainty will deter the FDI decisions by foreign firms.

As for completeness, it must be recalled that a third strand of the literature argues that other factors than price and real exchange rate volatility determine MNEs' investment decisions. These are, for example, geographical location, natural resource abundance and infrastructural development; with

respect to developing countries, see Dehn (2000) . Hence, an insignificant impact of uncertainty on FDI flows is expected.

For what concerns the empirical literature, the majority of the studies analyzing the impact of price and exchange rate volatility in developing countries confirms the theory of hysteresis and option value. See, for example, the work on Latin America of Udomkerdmongkol and Morrissey (2009); Udoh and Egwaikhide (2008) on Nigeria; and Del Bo (2009). Supportive evidence of the production flexibility argument is found, instead, for developed economies by Goldberg and Kolstad (1995); Chowdhury and Wheeler (2008) and Osinubi et al. (2009). Insignificant impact is found for laggard and advanced economies, respectively, by Nyarko et al. (2011) and Gorg and Wakelin (2002). Finally, mixed results, depending on the volatility proxy employed are found by Lemi and Asefa (2001) in their analyses of African countries and Ullah et al. (2012) on Pakistan.

The results of the present study are in line with the ones of the established literature. In particular, employing the Fixed Effect estimator and the GARCH model for retrieving the relevant volatility indicators, we find that exchange rate volatility has a negative impact of on FDI inflows in Latin America, while price volatility turns out to be positive but insignificant. Moreover, we show that human capital and trade openness are key for attracting foreign capital.

The rest of the paper is organized as follows. The second paragraph reports the estimable equation and the Table of results. The third discusses the original results obtained in the light of the relevant literature; it derives some policy implications and it indicates possible lines of future research. The fourth clarifies the methodological steps taken and it provides details on the variables as well as data sets employed. The fifth concludes.

2. Results

2.1. Estimable equation

Drawing from the works of Lemi & Asefa (2001), Ajuwon (2013), Yousaf et al. (2013), our estimable equation is formally written as:

$$FDI_{it} = \beta_0 + \beta_1 VINF_{it} + \beta_2 VER_{it} + \beta_3 INST_{it} + \beta_4 GDPPC_{it} + \beta_5 TO_{it} + \beta_6 HC_{it} + \beta_7 INFRA_{it} + \varepsilon_{it} \quad (1)$$

Where FDI represent the dependent variable and the subscripts i and t indicate, respectively, country and year. VINF and VER are price and real exchange rate volatility; INST represents a proxy for country-specific institutional quality (i.e. political freedom); GDPPC stands for per capita Gross Domestic Product; TO, HC and INFRA indicate, respectively, trade opennes, human capital and infrastructural development. As customary, ε_{it} represents an idyosyncratic error term.

2.2 Empirical Results

Table 1 reports the main results of the present analysis.

Dependent Variable: FDI			
Independent Variable	**FE**	**RE**	**Pooled-OLS**
C	-59.65***	-67.64***	12.83***
	[0.00]	[0.00]	[0.01]
VINF	0.005	0.02	0.15***
	[0.82]	[0.32]	[0.00]
VER	-35.31***	-35.38***	-81.39***
	[0.00]	[0.00]	[0.00]
INST	-0.01	-0.03	0.99
	[0.80]	[0.39]	[0.97]
GDPPC	-0.05	0.05	0.3***
	[0.60]	[0.52]	[0.006]
TO	0.22*	0.17**	0.06***
	[0.05]	[0.02]	[0.00]
HC	14.02***	15.44***	-2.91***
	[0.00]	[0.00]	[0.00]
INFRA	0.22	0.12	0.47***
	[0.18]	[0.27]	[0.00]
Country dummies	Yes	No	No
Time dummies	Yes	No	No
F-Stat	20.6		
	[0.00]		
R^2	0.9	0.66	0.59
Adjusted R^2	0.88	0.65	0.58
S.E. of regression	0.31	0.33	0.59
Hausman test, Chi^2: 21,9 [0.00]			

Notes: p-values in parenthesis; *** stand for 1% significance ; ** for 5% and * for 10%.

Column 1 in Table 1 reports our preferred estimates, obtained employing the Fixed Effects estimator with country and year dummies. Our results show that real exchange volatility has a negative and statistically significant negative impact on FDI in Latin American countries. In particular, a 1% increase in RER volatility decreases FDI inflows by more than 35 percentage points. Price volatility, instead, seems to exert a positive effect but it turns to be statistically insignificant. Among the other FDI determinants, human capital is the most important as it is found that a 1% increase in the literacy rate makes FDI inflows to increase by 14 percentage points. Trade Openness has a positive but smaller impact on FDI while domestic market size, institutional quality and infrastructure development are found to be statistically insignificant.

3. Discussion

Our results show that the impact of exchange rate volatility is consistent with the hysteresis and real option theory (Dixit and Pindyck, 1994). Currency volatility delays the entry of multinational firms because volatility increases the option value associated with waiting before incurring the sunk costs necessary to produce in a foreign country.

This finding is also consistent with the nature and characteristics of FDI pattern in selected economies. ECLAC (2013) reports that MNEs investing in the region are either seeking natural resources or export opportunities, or both, rather than new markets in the host countries. For example, 82% of manufactured units in Mexico are exported, with only the remaining 18% placed on the domestic market. Similarly, FDI in export-oriented manufacturing is also highly concentrated in other sampled countries (i.e. Nicaragua in garment and apparel manufacturing; Paraguay in cement and cable-manufacturing; Costa Rica in microprocessor industry and Brazil in the automotive, steel and computer industries.

Hence, as FDI in the sampled countries tend to be vertical (i.e. intended for export) rather than horizontal (i.e. aimed at the market of host countries), exchange rate volatility raises demand uncertainty for the export oriented firms and may decrease the profitability of FDI. Based on this observation, it can be argued that stability in exchange rates promotes FDI inflows in the region.

Turning to inflation rate volatility, it must be noticed that it does not show the expected sign, despite being statistically insignificant. As for the positive effect of price volatility, Hartman (1972) and Abel (1983) suggest that higher price-uncertainty raises the expected profitability of capital, increases the desired capital stock and ultimately increases the level of investment. This argument is based on the assumption of risk neutral investors, which has put under serious scrutiny by a number of works; see, for example, Sheifler and Vishny (1997). Another explanation can be related to the fact that, in the presence of increasing inflation, efficiency-seeking/export oriented MNEs may find convenient not to procastinate investment decisions and, hence, invest more. Although, the statistical insignificance of domestic price volatility suggest that FDI is less elastic to domestic price fluctuations than to exchange rate volatility.

Passing to human capital, our results are in line with the ones of established literature; see, for example, Alfaro et al. (2010); Alfaro and Charlton (2013); Bruno and Campos (2013). Human capital in host countries is an important factor for attracting FDI, as the more educated the labour force the faster the technological transfer and the lower the transaction costs, such as the ones of training.

For what concerns trade openness, our findings are consistent with the ones of Amal et al. (2010) and their study on FDI determinants in 8 Latin American economies, examined between 1996 and 2008; as well as with the ones of Wang and Swain (1995) obtained for a broader sample of developing countries. The general point is that export oriented MNEs may prefer to locate in more open economies, in order to minimise the transaction costs associated with exporting. Hence, Trade Openness triggers FDI inflows as the two strategies can be seen as complementary, see for a Espinosa Ramirez (2014) for a complete review in the context of Latin America.

Turning to market size, proxied by GDP per capita, Table 1 reports a negative although statistically insignificant impact on FDI to Latin America. The negative sign implies that larger market size can hinder the flow of foreign capital. For example, Abekah (1998) argues that, as host economies' GDP grows, capital requirements are increasingly met domestically. Hence, FDI inflows descrease.

Moreover, as according to ECLAC (2013), the majority of FDI in the region are export-oriented. Hence, the relative size of the domestic market might be less relevant than in the case of market-seeking investment. Finally, the insignificance of the estimated coefficient can be due to the fact that some of the sampled countries are quite small, in terms of population and, hence, domestic market size might be not a so relevant determinant of FDI.

Concluding the discussion of our results with the effect of institutional quality and infrastructural development, Table 1 shows that both variables turn out to be statistically insignificant. Despite the large attention that political stability have received for explaining FDI flows (see for Latin America, Amal et al., 2010), the negative and statistically insignificant coefficient is not highly surprising in the present case. This is due to the very low variability of the political freedom indicator here employed. Similar reasoning applies to the infrastructural development proxy. Despite these limitations, the chosen series have the great advantage of being available for all countries in the sampled period.

To summarise, in line with the established literature on developing countries, our study provides strong evidence of a negative impact of exchange rate volatility on FDI inflows in Latin America. Moreover, it shows that price volatility plays no statistically significant effects. Finally human capital and trade openness are found to be key factors for attracting foreign capital.

These findings do not only enrich the literature on the relationship of uncertainty and FDI, by providing new evidence on Latin America but they also bring important policy implications. First, in order to attract FDI in the region, policymakers should promote macroeconomic policies aimed at minimising exchange rate volatility, via the improvement of domestic fundamentals.

Another main finding of this research is that trade openness and educated labour force in host countries attract FDI. Accordingly, it is recommended that potential host countries maintain an FDI friendly environment by promoting an open trade regime and prioritize human capital formation. It is important to stress that the full benefits of such policies can be realized only if investors perceive government's efforts as credible and not subject to reversal. As a consequence, governments of host countries should develop mechanisms to enhance the governance credibility and stability.

To conclude our discussion, it is worth noticing that our study opens a twofold immediate line for future research. First, it would be important to distinguish among different types of FDI (i.e. vertical, horizontal, market seeking, etc…) as well as to take into account for industries specifities. This call for the use of more disaggregated data. Second, it would be important to control for external shocks, such as the recent global financial crisis, that have hit developing countries and the ones in the sample after 2012. This means that a full set of tests for structural breaks need to be carried out and that the dataset must be enlarged in its time dimension.

4. Materials and Methods

The present empirical analysis is based on a panel data set of ten FDI recipient countries from Latin America and the Caribbean region, observed between 1990 and 2012. In particular, the sampled economies are Brazil, Chile, Paraguay, Uruguay, Mexico, Costa Rica, Nicaragua, Dominica, Dominican Republic as well as Trinidad and Tobago.

Annual data on FDI inflows (in current $US) and trade openness (measured as the sum of Exports and Imports as % of GDP) are taken from UNCTAD. Those of real effective exchange rate index

(2010 = 100), inflation (i.e. GDP deflator), Gross Domestic Product per capita (in current $US), literacy rate -adult total (% of people ages 15 and above)-, telephone lines per 1,000 inhabitants are taken from World Bank-World Development Indicators. Political freedom (measured on 1-to-7 scale) is taken from Freedom House.

The methodological steps here taken are three. First, the Augmented Dickey-Fuller (ADF) Fisher panel unit root test is employed to examine the stationarity of the series. Second, a GARCH (1,1) model is used to generate price and real exchange rate volatility series. Finally, different panel data estimators are employed to assess the impact of volatility on FDI inflows.

Beginning with the ADF Fisher panel unit root test, testing for data stationarity is a mandatory step (see for full details Engle and Granger, 1987; and Granger and Newbold, 1974). The rationale for conducting panel unit root test instead of individual unit root test for single series is based on its overwhelming advantages, i.e. more powerful as the information in the time series is enhanced by that contained in the cross-section data, panel unit root tests lead to statistics with a normal distribution in the limit in contrast to individual unit root tests with non-standard limiting distributions (Baltagi, 2001). Since the power of unit root tests depends on the total variation in the data used (both in the number of observations and their variation), panel unit root tests are more powerful than standard time-series unit root tests because the variation across countries adds a great deal of information to the variation across time, resulting in potentially more precise parameter estimates (Taylor and Sarno, 1998). Among the available panel unit root tests, the ADF Fisher test proposed by Maddala and Wu (1999) and Choi (2001) is chosen because, on the one hand, it does not require a balanced panel and, on the other, it can use different lag lengths in the individual ADF regressions.

Turning now to the GARCH for modeling volatility (Engle, 2001; Bollerslev, 1986), such a method is based on the assumption that the variance of the error terms of a variable is not equal over time. In particular, it is assumed that the variance is larger in some periods than others and that periods of higher variance are clustered together. GARCH is useful in that it uses the heteroscedasticity present in the variables of interest and models it. Such methodology has been widely used for measuring both exchange rate (Mahmood et al., 2011; Chowdhury and Wheeler, 2008) and price volatility (Lemi & Asefa, 2001; Ullah et al., 2012). Following the methodology described in Engle (2001), we found that both RER and inflation's true variance process can be specified by a GARCH (1,1). This means that next period's conditional variance is a weighted combination of the unconditional variance of variable of interest, last period's squared residuals and last period's conditional variance, where the weights sum to one.

Finally, in order to estimate Equation (1), we employ the Fixed Effect estimator with both country and year fixed effects. Our choice is supported by standard diagnostic tests. In particular, we employ the F-test for detecting the presence of country and time fixed effects against Pooled-OLS. Fixed Effect estimator is preferred to Random Effects on the basis of the Hausman test. See Table 1 for details.

5. Conclusions

The present work is aimed at empirically assessing the impact that price and real exchange rate volatility had on FDI inflows in a panel of Latin American countries, between 1990 and 2012. Using GARCH techniques for modeling volatility and the Fixed Effect estimator, our findings confirm the

real option theory and, hence, the negative impact of exchange rate volatility on FDI inflows in Latin America. Moreover, it is shown that price volatility seems not to be relevant. Finally human capital and trade openness are found to be key factors for attracting foreign capital. All these results are consistent with the established literature on developing countries.

From the policy perspective, our analysis suggests the importance of stabilization policies as well as the one of government credibility in promoting trade openness and human capital formation.

To conclude it is worth mentioning that our study can be extended in a number of ways, such as controlling for FDI types, industries' specific characteristics as well as the effects of recent crises. This is left for future research.

References

Aastveit, K. A., G. J. Natvik, and S. Sola. Economic Uncertainty and the Effectiveness of Monetary Policy. *Norges Bank Working Paper Series* **2013**, 17.

Abel, A. Optimal Investment under Uncertainty. *American Economic Review* **1983**, vol. 73, pp. 228-233.

Abekah. Overseas Private Investment Corporation and Its Effects on U.S. Direct Investment in Africa. *Journal of African Finance and Economic Development* **1998**, Vol. 3, No.1.

Ajuwon. Macroeconomic Environment, Policy Uncertainty and Inflow of Foreign Direct Investment: Impact and Policy Implications for Nigeria. *Mediterranean Journal of Social Sciences* **2013**.

Alfaro, L., and A. Charlton. Growth and the Quality of Foreign Direct Investment: Is All FDI Equal? The Industrial Policy Revolution I: *The Role of Government beyond Ideology by Palgrave Macmillan* **2013**.

Alfaro, L., A. Chanda, S. Kalemli-Ozcan, and S. Sayek. How Does Foreign Direct Investment Promote Economic Growth? Exploring the Effects of Financial Markets on Linkages. *Journal of Development Economics* **2010**, 91, 242-256.

Amal et al. Determinants of Foreign Direct Investment in Latin America. *Revista Journal* **2010**, Vol. 4, No. 3.

Arellano, C., Y. Bai, and P. J. Kehoe. Financial Frictions and Fluctuations in Volatility. *Federal Reserve Bank of Minneapolis Research Department Staff Report* **2012**, 466.

Baltagi, B. H. Econometric Analysis of Panel Data. *John Wiley & Sons Second Edition* **2001**.

Bernanke, B. Irreversibility, Uncertainty and Cyclical Investment. *Quarterly Journal of Economics* **1983**, vol. 98, pp. 85-106.

Bloom, N. The Impact of Uncertainty Shocks. *Econometrica* **2009**, 77, 623–685.

Caggiano, G., E. Castelnuovo, and N. Groshenny. Uncertainty Shocks and Unemployment Dynamics: An Analysis of Post-WWII US Recessions. *Journal of Monetary Economics* **2014**, 67, 78 -92.

Chowdhury & Wheeler. Does Real Exchange Rate Volatility Affect Foreign Direct Investment? Evidence from Four Developed Countries. *The International Trade Journal* **2008**, Vol. 22, No. 2.

Cushman, D. Real Exchange Rate Risk Expectations, and Exchange Rate Risk during the Floating Period. *Review of Economics and Statistics* **1985**, vol. 67, pp. 302-307.

C.W.J. Granger and P. Newbold. Spurious Regressions in Econometrics. *Journal of Econometrics* **1974**, Vol. 2, 111-120

Dal Bianco, S., Amini, C. and Signorelli, M. The Impact of the Global Financial Crisis and the Role of External and Internal Factors in Emerging Economies. *Emerging Market Finance and Trade* **2016,** Forthcoming.

Dehn, Jan. Private Investment in Developing Countries: The Effects of Commodity Shocks and Uncertainty. *Center for the Study of African Economies* **2000**, University of Oxford, working paper series 2000 -11.

Del Bo. Foreign Direct Investment, Exchange Rate Volatility and Political Risk. *ETSG Annual Conference* **2009**.

Dixit, A. and R. Pindyck. Investment under Uncertainty. *Princeton University Press* **1994**.

Dunning, J.H. The Eclectic Paradigm as an Envelope for Economic and Business Theories of MNE Activity. *International Business Review* **2000**, 9: 163-90.

ECLAC Report. Foreign Direct Investment in Latin America and the Caribbean Report. *Economic Commission for Latin America and the Caribbean (ECLAC)* **2013.**

Goldberg and Kolstad. Foreign Direct Investment, Exchange Rate Variability, and Demand Uncertainty. *International Economic Review* **1995**, Vol 36 (4), pp. 855-873.

Gorg, H., & Wakelin, K. The Impact of Exchange Rate Volatility on US Direct Investment. *The Manchester School* **2002**, 70(3), 380-397.

Hartman. The Effects of Price and Cost Uncertainty on Investment. *Journal of Economic Theory* **1972**, 5(2), 258–266.

In Choi. Unit Root Tests for Panel Data. *Journal of International Money and Finance* **2001**, Vol. 20m 249 -272

Lemi & Asefa. Foreign Direct Investment and Uncertainty: Evidence from Africa. *Center for Economic Research on Africa* **2001**.

Lipsey. Interpreting Developed Countries' Foreign Direct Investment. *NBER Working Paper* **2000,** No. 7810.

Maddala, G.S. and Wu, S. A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics* **1999**, Vol. 61, 631-652.

Mahmood et al. Exchange Rate Volatility & Macroeconomic Variables in Pakistan. *Business Management Dynamics* **2011**, 1(2), 11-22.

Mumtaz, H. and P. Surico. Policy Uncertainty and Aggregate Fluctuations. *Working Paper* **2013**, School of Economics and Finance, Queen Mary, University of London.

Nyarko et al. Effects of Exchange Rate Regimes on FDI Inflows in Ghana. *International Journal of Economics and Finance* **2011**, 3(3), p277.

OECD Benchmark Definition of Foreign Direct Investment, *Fourth edition* **2008**.

Osinubi et al. Foreign Direct Investment and Exchange Rate Volatility in Nigeria. *International Journal of Applied Econometrics and Quantitative Studies* **2009**, Volume 6(2), pp. 1- 13

Rafael Salvador Espinosa Ramirez. Integration and Foreign Investment in Latin America. *Handbook of Research on Economic Growth and Technological Change in Latin America* **2014**, 105-124.

Randolph L. Bruno and Nauro F. Campos. Re-examining the Conditional Effect of Foreign Direct Investment. *IZA DP* **2013**, No. 7458 6/2013.

Robert Engel. GARCH 101: The Use of ARCH/GARCH Models in Applied Econometrics. *Journal of Economic Perspectives* **2001**, Vol. 15, 157-168.

Robert F. Engel, C.W.J. Granger. Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica* **1987**, Vol. 55, 251-276.

Shleifer and Vishny. The Limits of Arbitrage. *The Journal of Finance* **1997**, Vol. LII, No. 1

Taylor, M.P., and L. Sarno. The Behavior of Real Exchange Rates during the Post-Bretton Woods Period. *Journal of International Economics* **1998**, Vol. 46, pp. 281-312.

Tim Bollerslev. Generalized Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics* **1986**, Vol. 31, 307-327.

Udoh & Egwaikhide. Exchange Rate Volatility, Inflation Uncertainty and Foreign Direct Investment in Nigeria. *Botswana Journal of Economics* **2008**, 5(7), 14–31.

Udomkerdmongkol and Morrissey. Exchange Rates and Outward Foreign Direct Investment: US FDI in Emerging Economies. *Review of Development Economics* **2009**, Volume 13(4), pp. 754-764.

Ullah et al. Impact of Exchange Rate Volatility on FDI. *Pakistan Economic and Social Review* **2012**, 50(2), 121–138.

Wang and Swain. The Determinants of Foreign Direct Investment in Transforming Economies: Empirical Evidence from Hungary and China. *Weltwirtschaftliches Archiv* **1995**, 131, pp. 359-82.

World Economic Outlook. *IMF* **2014.**

World Investment Report Overview. *UNCTAD* **2014**.

Yousaf et al. Impact of Exchange Rate Volatility on FDI in Pakistan. *IOSR Journal of Business and Management* **2013**, Volume 12, Issue 1.

Zeira, J. Cost Uncertainty and the Rate of Investment. *Journal of Economic Dynamics and Control* **1990**, vol. 14, pp. 53-63.