

Effects of Exchange Rate Regimes on FDI Inflows in Ghana

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Abstract

This paper investigated the effect of exchange rate regime on FDI inflows in Ghana. We modelled the causal relationship between FDI inflows and exchange rate regimes over a 39 year period (1970-2008). The paper employed the Ordinary Least Squares and the Cointegration technique to investigate the phenomenon. The variables were checked for stationarity after which a parsimonious Error-Correction model was estimated. Our findings indicated that exchange rate regime has no discernible effect on Ghana's FDI. At best, the link is weak since it was only found to be significant at the 10% level. Democracy was found to have the expected positive sign and to be a robust determinant of FDI in Ghana. By implication, Ghana's quest to attract FDI should go hand in hand with her efforts at sustaining the ongoing democracy. The contribution of this paper to the empirical literature lies in modelling exchange rate regimes and FDI inflows to Ghana. Previous studies on Ghana had concentrated on exchange rate misalignment and pass-through and their effect on FDI. Unravelling the empirical relationship between the FDI and exchange rate regime nexus on Ghana makes modest contribution to the empirical literature.

Keywords: Exchange rate regime, FDI inflows, Cointegration, Ghana

1. Background

While portfolio investors (PIs) have no controlling interest in their investments, but principally seek for maximum returns on their funds; Foreign Direct Investors (FDIs) conceptually extend corporate control over external frontiers with the long-term prospects of making profits in mind (Ashwini 2003). The implications of alternative exchange rate regimes (ERRs) for the flow of FDI is one of the central issues in International Economics (IE) since our knowledge on this issue from theoretical view points, contrasts with the relatively weak empirical findings on the subject. This is interesting for Ghana, which since independence has pursued exchange rate policies that have seesawed between controls and liberalisation as shown in Figure 1.1.

Figure 1.1, affirms that though, most developed nations adopted the flexible ERRs in 1973; it was Ghana's economic reform programme (ERP) in 1983 that formally led her to adopt the liberalised ERR. This movement from the fixed to the flexible ERR generated a controversy for Ghana. Structurally, it is unclear whether the flexible ERR is actually beneficial as mostly claimed in attracting FDI, which successive governments accept as significant for the nation's development. Using the ERRs as the basis as shown by Figure 1.2, Ghana has a long history of FDI that fall into four distinct periods of: *the post-independence up to 1982*(FDI oscillating growth era); *the 1983- 1988* (the sluggish and a near death growth of FDI era); *1989-1999*(the rebirth and the peaking of FDI era) and *2000- 2008*(the gradual restoration for FDI inflows era).

The objective of this article was to ascertain, based on Ordinary Least Square (OLS) model, the linkage between ERR and FDI in the Ghanaian context within the broader increasingly competitive world for FDI. The role of exchange rates in influencing FDI inflows has become a well-studied topic since the 1990s (Froot and Stein 1991). Thus, the emphasis placed on exchange rate as a determinant of FDI coupled with the structural break in FDI inflows in 1994 in Ghana gave rise to this article's question of "What effect does ERR has on FDI inflows in Ghana within the period of 1970-2008. The outcome of this study should complement the government's efforts at making Ghana an attractive hub for FIs within the Sub-Saharan Africa (SSA) following her discovery of oil in commercial quantities.

1.1. Problem Statement and the justification for the Study

While the policy measures of the ERP were generally deemed successful in turning the economy round, it is doubtful if this was sufficient in attracting FDI inflows in Ghana. Given the potential role FDI can play in accelerating economic growth, studying its determinants in Ghana is germane in order to properly position her within the recent changing global economic conditions, industrial structures and oil discovery. In fact, Ghana today claim to have successfully liberalised her investment climate to make it more attractive to FIs, but while intensive liberalisation is vital to FDI inflows, it is obviously inadequate in this competitive world for FDI.

The ERR is undeniably a key determinant of a country's macroeconomic stability as the ability of monetary policy to deal with inflation, exchange rate volatility and misalignments is greatly dependent on this policy variable. Moreover, considering the fact that the ERR is frequently altered, either voluntarily or involuntarily to reflect an economy's global competitiveness coupled with FIs inability to hedge at their horizon as far as derivative markets are concerned, studying the linkage between an operative ERR and FDI flows is justified. Since Ghana is a potential candidate for OPEC membership, Ghana is now more likely to be exposed to external shocks than before. However, review of extant literature on FDI pointed to the fact that no study exists for Ghana on "the effects of ERRs on FDI inflows though some have written on the determinants of FDI in Ghana in general. This is interesting in the light of the fact that over the years several Ghanaian governments had managed or freed the exchange rates in the attempts to make the nation an attractive FDI hub within SSA. This obviously signifies a gap in the empirical studies devoted to the study of FDI inflows in Ghana since by virtue of her geographical location; drivers that have been successful in other regions in attracting FDI may not necessarily be relevant in the Ghanaian context.

The rest of the paper was organised as follows: Section 2 dealt with the theoretical and empirical literature; Section 3 described the econometric modelling; presented the study's results and discussions and the last Section concluded the study.

2. Theoretical Surveys

2.1 Exchange rate and FDI linkages:

Although, empirical studies suggest some linkage between the ERRs and FDI inflows, the literature capturing this relationship has largely been scanty. However, Devereux and Engel (1999) studied the welfare impact of fixed and floating ERRs in the presence of a stylized form of FDI. Their study was one of the pioneering attempts at exploring this relationship. Some experts capture the linkage between exchange rate and FDI by arguing that stronger FDI implications from exchange rate movements are due to relative wage variations that are unanticipated in the expected costs of project finance for FDI. Others also capture this linkage by arguing that imperfect capital market considerations lead to rate of return on investment projects that depend on the capital market structure in varying regimes and/or countries. Hence, available literature on ERRs and FDI relationship indicate they either fall into the production flexibility school or the risk-aversion arguments or the "exchange rate sheltering hypothesis".

2.1.1 The production flexibility argument primarily assumes that FIs are risk-neutral and that generally diversify globally to increase the flexibility of production in response to shocks under conditions of free entry as dictates by the operative ERR of an economy (Aizenman 1992; 1994). Generally, this model predicts that fixed ERRs are more conducive to FDI flows than the flexible ERRs since the former is better at insulating real wages and production from monetary shocks than the latter (Ito et al. 1996). However, Bacchetta and van Wincoop (2001) established that welfare comparisons favour fixed exchange regimes when consumption, leisure and FDI flows are complements while the floating regime is preferred when these goods are substitutes. Additionally, it holds that more volatility with a regime triggers more FDI *ex ante* and more potential for excess capacity and production shifting *ex post*, after exchange rates are observed. Analysts are of the view that this postulate is less likely to pertain to short term volatility in exchange rates than realignments over longer intervals.

2.1.2 The risk-aversion stance posits that in an imperfect world due to information asymmetry, sociological and macroeconomic factors and natural occurrences; producers in the effort to better adapt to trade cycles diversify

globally across varying exchange rate regimes to secure returns on their investments and ensure sustainable supplies. Froot and Stein (1991) and Blonigen (1997) affirmed that incomplete information stimulates FDI flows due to relative wealth effects from exchange rate movements. However, Cushman (1985) offered a middle ground for the production flexibility and risk-aversion arguments by asserting that where firms have the option of serving foreign markets via exports or FDI, increased exchange rate volatility likely favours FDI as opposed to export. This assertion, Sercu and Vanhulle (1992) found otherwise. This theory is credited as more convincing than the production flexibility argument in relation to the effects of short-term exchange rate variability which is viewed as exogenous and unanticipated to economic activity.

2.1.3 The exchange rate sheltering hypothesis asserts that firms from countries whose currencies command a premium have advantage in investing abroad and that real exchange rate depreciation can be harmful to domestic production as it precludes foreign competition. Appraisal of this hypothesis suggests it is inconsistent with the profit-maximising behaviour of firms. Also, it is unable to justify why firms of strong currency economies enjoy hedging or diversification advantages in spite of FIs persistent ignorance in making decisions (Aliber 1970; Lafrance and Schembri 2000). Goldberg and Kolstad (1995) contrary to Froot and Stein (1991) extended Campa's (1993) claim that an appreciation of host currency in fact increases FDI inflows.

2.2 Empirical Literature

While most of the FDI theories have some empirical backing, there is not sufficient support for any single hypothesis (Lizondo, 1990). The selected studies for this piece were meant to justify the suitability of our adapted model in establishing the relationship between exchange rate regimes and FDI inflows within the Ghanaian context. Accam (1997) using *OLS* estimation for 20 LDCs employed the standard deviation of the exchange rate as a proxy for instability and found a negative significant relationship between exchange rate uncertainty and FDI for the study period. Agodo (1978) with data on 33 US private manufacturing firms with 46 investments in Africa discovered the domestic market size, the raw materials endowment, availability of primary infrastructure and political stability as drivers of FDI in Africa in the 1960s. Artige and Nicolini (2005) analysed FDI inflows into a group of European regions with *disaggregated data*. They found that in spite of regional economic similarities FDI flows rely on a combination of factor endowments, lags in diffusion of innovations, demand considerations, role of governments, economies of scale and international capital mobility inter alia. Bailey and Tavlas (1991) like Cushman (1985) established that higher exchange rate volatility explains FDI flows from the US to Canada, France, Germany and Japan. However, Barrell and Pain (1996) using a dummy for exchange rate controls in a profit-maximising *regression* model affirmed that expected appreciation in the dollar temporarily postponed US outward FDI flows within their study period.

Again, Brainard's (1997) *random effects* estimation confirmed freight costs to the export market; the host country tariffs; market size, trade openness, measures of plant scale economies and political stability as significant drivers of US FDI flows into LDCs. Dar, Presley and Malik (2004) using *OLS and the cointegration technique* established two-way causality relationship between economic growth, exchange rate and level of interest rates, unemployment, and political stability as determinants of FDI inflows for Pakistan over the period 1970-2002. Froot and Stein (1991) and Blonigen (1997) found a positive linkage between US dollar depreciations and FDI inflows over the 1978-88 period. However, Stevens (1993, 1998) found this result fragile when he extended the sample to 1999. Goldberg and Kolstad (1995) with *risk-aversion* model examined the effect of short-run exchange rate variability on US bilateral FDI flows with Canada, Japan and the UK over the 1978-91 and found the exchange rate variability positive and statistically significant in four of the six bilateral FDI shares. This finding contradicts with Gorg and Wakelin (2002) revelations that exchange rate volatility was statistically insignificant in US FDI flows into 12 developed economies for the period 1983-1995. Gyasi, Asante and Tsikata (2000) with *OLS* supplemented by a firm level survey also found openness, trade regimes, the investment climate, land, democracy and exchange rates as significant drivers of inward FDI in Ghana.

Kosteletou and Liargovas (2000) examined the linkage between FDI flows and ERRs in a *simultaneous equation* model for a large sample of industrial countries based on annual data over the 1960-97 period and established that for most countries, real exchange rate appreciation associated with flexible ERR induces FDI inflows. Olumuyiwa's (2003) using *OLS* estimation in Nigeria found variations in the official exchange rate significant for agricultural sector FDI but insignificant for the manufacturing sector. Shafer and Loopeska (1983) and Flood and Rose (1995) looked at the performance of key macroeconomic variables under different ERRs and found that the ERR microscopically affect FDI flows for many LDCs. In contrast, Caporale and Pittis (1995) found regimes significant in FDI flows for 18 OECD countries over the period 1960-91. Alba, Park and Wang (2009) with panel data from the wholesale trade sector modelled the impact of exchange rate on FDI and the interdependence of FDI over time in the context of US with the two-state Markov process. Like Campa, they established that under favourable FDI

environment, the exchange rate has a positive and significant effect on the average rate of FDI inflows within their study period. Thus, to them a stronger US dollar is a necessary condition for FDI inflows into the wholesale trade sector. While there are no qualms about the statistical significance and positive effects of FDI predictors such as democracy in the context of SSA, the literature is however, less emphatic on causal relationship between FDI and exchange rate regimes. It is against this backdrop that this paper contributes to the empirical literature.

3. Methodology

3.1 Theoretical framework

Various models are applicable to the estimation of the ERRs and FDI inflows linkage. This study accepted the profit-maximising behaviour of investors and opted for a framework that provide FIs insights into Ghana's structural features, macroeconomic policies, experimentation with ERRs and political issues. Thus, the question was tackled from a macroeconomic perspective using *OLS* framework for the period 1970-2008 due to data constraints. Generally, four regressions were run with the first estimated without the variable of interest; the second had the ERR dummy introduced to see how the regressors altered in the analysis. Before the parsimonious regression 4, researchers experimented with other variables known to impact on FDI inflows in regression 3.

3.2 Model Specification

To capture the relationship between ERRs and FDI inflows, a simple model by Matthias Busse (2003) in his analysis of democracy and FDI was adopted and modified to suit the peculiarities of Ghana as:

$$FDI = f(ERR, v) \quad (1)$$

Where FDI is a function of policy distortions (ERR) and v control variables that can impact FDI inflows overtime.

The model was linearised for estimation as:

$$FDI_t = b_0 + b_1G[POPY] + b_2OP + b_3FDI_{-1} + b_4DE + b_5ERR + b_6T + \varepsilon_t \quad (2)$$

The variables were selected based on the FDI empirical literature and the peculiarity of the Ghanaian situation. Again, the linear specification of the model might be questioned, however, Chakrabarti (2001), has confirmed that in country-specific analysis, modelling FDI determinants in semi-log form can improve the overall fit and the significance of the coefficients. Table 3.1 captured how these variables were measured and their *a priori* expected signs with the regressand.

3.2.1 Justification for the choice of the Regressors

Market Size and Potential (GDP per capita/Population): Visibly, demand factors are either qualitative or quantitative (Narula 1993) but, given the complexities of measuring quality of demand in aggregate terms, this study captured market size quantitatively. Previous studies have proxy the market size with real or real lagged GNP (Culem 1988), GNP, population (Alam 1992; Kobrin 1976) or GDP (Veugelers, 1991; Alam, 1992) or GNI per capita (Matthias, 2003) or GDP per capita (Tsikata, Asante and Gyasi 2000), log of the GDP per capita (Asiedu 2002). Studies that have affirmed the market size hypothesis are Scaperlanda and Mauer (1969); Kravis and Lipsey (1982); Schneider and Frey (1985); Wheeler and Mody (1992); Tsai (1994); Loree and Guisinger (1995); Lipsey (1999); Wei 2000); Bandera and White 1968) & Morrissey and Rai (1995). Like (Asiedu 2002) this study captured the market size via log of the GDP per capita and experimented as well with the population in regression 2.

Trade Openness/Capital Restrictions (OP): Although, some studies have found a positive relationship between openness and FDI flows (Morisset 2000 and Chakrabarti 2001) this study acknowledged a complex relationship between openness and FDI and simplified this complexity with a distinction between "*openness to trade*" and "*openness to capital flows*." While the former refers to the ease by which goods and services are exchanged, the latter refers to non-restrictions on the movement of capital for the period of study. Though, some studies have proxied trade openness with trade taxes, ratio of exports to GDP (Bhargawati 2001), this study like that of (Tsikata Asante and Gyasi 2000; Matthias 2003) measured openness as the ratio of merchandise trade to GDP. While a positive sign was the norm for "*resource-seeking*" FDI, a negative sign in this study suggest "*tariff-jumping*" FDI in Ghana.

Investment Climate (FDI_{t-1}): though, this piece acknowledged that investment climate can be captured severally it opted for the "*agglomerative effect*" that suggests "*FDI begets FDI*". Thus, in this study it was postulated that higher levels of FDI in previous periods must induce more FDI inflows within the study period.

Political Factor (De): *Ceteris paribus*, democratic and stable economies respect for civil liberties, the rule of law and property rights made them more conducive for FDI than despotic and unstable countries (Shneider & Frey, 1985). (Matthias, 2003 and Ashwini 2003) both proxied political rights with Freedom house scores, but this paper like that

of (Tsikata, Asante & Gyasi, 2000) measured political rights by type of government dummy due to authors inability to obtain freedom house scores for the relatively long period of time. De was expected to be positively correlated with FDI flows.

Policy Distortion (ERR): a variable for policy distortions was included to capture fiscal and monetary imbalances within Ghana over the study period. Although, the researchers realised the black market premium would have been more desirable for the analysis, the limited availability of data for Ghana precluded its usage. Additionally, Ghana's adoption of the liberalised ERR in 1983 had made black markets less prominent in Ghana, hence, a dummy capturing ERRs in the country was appropriate for this study.

3.2.2 Data Sources

The data source for the dependent and explanatory variables was the *World Development Indicators* (WDI) CD Rom published by the World Bank. The data are annual and range from 1970 to 2008 (a 39-year period).

3.3 Econometric methods and estimation techniques

To incorporate recent developments in time series modelling, the study looked beyond the traditional regression problems of autocorrelation, multicollinearity and simultaneity and considered the dynamic specification of the series. Augmented Dickey-Fuller (ADF) was used to establish *stationarity* to ensure that results are appropriate for policy recommendations (Charemza and Deadman 1992). Following Box-Jenkins (1970), researchers *differenced* via ADF method to deduce the order of *cointegration* of their time series data. Again, on the advice of Engel and Granger (1987) on differencing, researchers *reparameterised* their model into an Error Correction Model (ECM) to capture possible long run information that might have been lost in the course of differencing. In line with Adams (1993) claim, a lag structure of 2 was specified for the explanatory variables (except, ECM) and gradually reduced to the *parsimonious* model (4). E-views and PCGV8 software packages were used for the regressions, unit root and cointegration. Finally, to ensure that the predictive power of the model is unquestionable a battery of tests for the normality of residuals, homoscedasticity of errors, serial correlation, structural stability and Ramsey's reset test were run to support the empirical results (Kramer et al. 1985).

3.4 Data Analysis

3.4.1 The Descriptive Statistics of the Data

The mean, standard deviation, minimum and maximum values for the independent and dependent variables suggest several of them varying significantly. The unusually high maximum value for FDI flows was due to extremely high FDI flows in the 1990's and the early 2000's that marked a structural change in FDI flows in Ghana. Plausible explanations to this structural change in FDI flows in 1994 are the establishment of the Ghana investment promotion council to develop and promote investment in the country. As a matter of fact this body promulgated laws to make the nation conducive to investment. Again, it was obvious that within this dispensation the nation had reached advanced stage in her exchange rate liberalisation process. Further, the acquisition of the Ashanti Goldfields and a stake in Ghana telecom by telekom Malaysia partially accounted for this structural change in FDI flows into the country. A look at the correlations matrix indicates that all relationships of the control variables with FDI were in the expected directions (table 3.2). *ERR* was moderately correlated with FDI, indicating FIs consider the operative ERR in choosing a destination for their investments. The performed unit root test excluding the dummies revealed that all five variables were non-stationary in the levels. However, they were integrated of (*order 1*) as shown in table 3.3.

3.4.2 Results of the Cointegration Analysis

For the ECM, the cointegration of the residuals (Fox) that spanned the variables in equation (2) was stationary at level (0). The t-value (at lag one) obtained from the residuals was -5.7549. The ADF critical values at 1% and 5% levels of significance were respectively -4.417 and -3.622, suggesting that the variables in equation (2) were co-integrated in levels.

3.5 Discussion of Results

The results for the ECM as estimated in (table 3.4) indicated that, all the coefficients were correctly signed except the market size/potential variable (G) and that the overall performance of the FDI determinants was quite satisfactory with high computed F-values in all the 4 regressions at 5% significance level. The high-adjusted R² values indicated that FDI inflows were adequately explained by the variations in the regressors. The time trend coefficient proved insignificant for FDI inflows over the study period. The diagnostic tests in table 3.4 confirmed the model's robustness by guaranteeing homoscedasticity (*the ARCH test*), no autocorrelation (*the Durbin-h test*) and normal distribution of residuals (*the normality test*). Finally, the regression specification test (*the RESET*) vindicates the model as correctly specified mathematically.

Regression 1 affirmed openness; FDI₁; democracy and fox_1 as the four variables with significant t-statistics. The significance of the coefficient of *Openness* confirmed that within the study period FIs make export-oriented investments in Ghana. Again, the result affirmed the *agglomeration effect* for Ghana and so was *Democracy* found to have the expected positive sign and significant at five percent. Also, given that no deviation was in the regressors, the average value of the FDI inflows in Ghana for the period was GH¢1,700. Finally, Fox_1 (the lag of the residual) carried the expected sign and was significant at 5% level. This implies should FDI deviates from its long run level; there is an in-built mechanism to correct this disequilibrium at a moderate speed of 46% per year.

In general, the market size variable was wrongly signed and statistically insignificant in regressions 1 and 2. Experiment with the population variable in regression 3 suggest, the market influenced FDI positively but not rigorously so in Ghana. A plausible explanation for this contradiction to the market size hypothesis was the dominance of the extractive sector especially the mining sector over the non-extractive ones in attracting FDI inflows in Ghana. Based on the findings above, it was necessary to control for market and time trend in the parsimonious model (4). Investment climate and Fox_1 were repetitively significant at 1% with the democracy variable carrying the expected positive sign and significantly different from zero at 5% in regression 4. The robustness of the *Openness* carried the expected positive sign in regressions 1, 2 and 4 but the wrong sign in regression 3 confirming Ghana as host for both export-oriented and tariff-jumping FDI over the period. A conceivable explanation for this is the influx of FDI into gold and manganese mining and the relative importance the services' sector assumed within the period. The statistical significance of *political factor* at 1% and 5% in regressions 2 and 4 respectively vindicated NGO's campaigns for democracy to be deepened in LDCs and supported Rodrik's (1996), Harms and Ursprung (2002) and Tsikata, (1977, 1996a) findings as well.

The variable of interest (ERR) partially fulfilled the conventional wisdom. Although, statistically insignificant, it had the right positive sign in tests 2 and 4, implying flexible ERR influenced FDI positively but not rigorously so. This finding partly confirms Alba, Park and Wang (2009) and Campa's findings of exchange rate impact of FDI inflows into the US economy. For flexible ERR insignificance it could be attributed to the chosen proxy for policy distortion as a dummy alone could not reflect intermediate regimes, which undoubtedly affected FDI flows within the study period. This result suggests that currently, no school of thought on ERRs has clearly caught the world's attention in terms FDI inflows into an economy. The implication is FIs prefer to invest in countries with well-established mechanisms for adjusting their exchange rates regardless of the ERR in place.

4. Conclusion

The effect of exchange rate regimes on FDI inflows is relevant due to the realisation that FDI is certainly not a zero-sum game in the literature. The study's results should be interpreted bearing in mind that not all important determinants of FDI were incorporated in the regressions and that the quality of data was also suspect and that an extension of the study must be considered as better data become available on at least quarterly basis. The study found investment climate, the nature of government, the policies of trade openness and capital restrictions as the drivers of FDI in Ghana. Finally, the contribution of this paper is that ERRs do not really matter for FDI inflows in Ghana and policy makers efforts at stabilising the exchange rate may not necessarily translate into significant FDI inflows into the country.

Hence, the paper would recommend that Ghana's current flexible ERR be backed with policies that are more explicit in attracting FDI inflows. Again, the study suggests to policy makers to deepen Ghana's present democratic process so to make her a preferred destination for FDI inflows. Finally, it is important from the study's result that policy makers should strive to establish and maintain an open trade regime to guide FIs to manage their operations efficiently within an FDI friendly environment.

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Table 3.1. Parameters, their measurement and expected signs

Variable	How Captured	Expected sign
FDI_t	Annual FDI inflows to GDP	
G_t	GDP per capita (In log form)	+
POP_t	Population to GDP	+
OP	ratio of trade to GDP (In log form)	+/-
FDI_{-1}	lag FDI to GDP	+
DE	Dummy (military rule, $d = 0$; period of civilian rule, $d = 1$)	+
ERR	ERRs dummy (Period of fixed exchange rate, $d = 0$; period of Flexible exchange rate regimes, $d = 1$)	+/-
TI_t	a time dummy to control for factors over time that may affect FDI	+/-
ε_t	stochastic disturbance term	

Source: Authors' Contribution, 2010

Table 3.2. An estimated correlation matrix of variables

	FDIGDP	LOGOPEN	LOGGDPPC	LAGFDIGDP	DEMORA	EXRR	LOGPOPY	IT
FDIGDP	1							
LOGOPEN	0.521366	1						
LOGGDPPC	0.443403	0.415628	1					
LAGFDIGDP	0.584868	0.481833	0.220175	1				
DEMORA	0.609955	0.332253	0.520259	0.546263	1			
EXRR	0.317989	0.399411	0.74308	0.24518	0.288675	1		
LOGPOPY	0.480102	0.467126	0.994525	0.252144	0.532631	0.725722	1	
TTREND	0.476283	0.43977	0.99486	0.242096	0.550278	0.702577	0.997903	1

Table 3.3. Summary Statistics of Unit Root Tests

Variable	Levels/1st differencing	ADF	
		With trend and constant	Conclusion
FDI	1 st difference	-5.644261	I(1)
G	1 st difference	-3.690443	I(1)
OP	1 st difference	-4.487922	I(1)
FDL ₁	1 st difference	-6.584666	I(1)
POPY	1 st difference	-5.848665	I(1)

Notes: Unit root tests was performed with ADF test

99% critical values for ADF statistic (variables in first difference) = -4.3082

Table 3.4. Modelling FDI/GDP by OLS: 1970-2008

Unknown	Reg. 1	Reg. 2	Reg. 3	Reg. 4
Constant	0.17246 (1.387)	0.57744 (2.656)	-0.25220 (-0.300)	-0.066493 (-0.449)
DLOP	0.82793** (2.213)	0.39607* (1.923)	-0.50321* (1.984)	0.28402 (0.591)
DLG	-0.23635 (-1.003)	-0.73087 (-0.884)	---	---
DLPOPY	---	---	1.7028 (0.102)	---
Unknown	Reg. 1	Reg. 2	Reg. 3	Reg. 4
Constant	0.17246 (1.387)	0.57744 (2.656)	-0.25220 (-0.300)	-0.066493 (-0.449)
DFDI/GDP_1	0.13520*** (4.347)	0.34315** (2.058)	0.30480*** (3.895)	0.45565*** (3.617)
DEMCRA	0.93003** (2.459)	0.66963*** (4.402)	0.78752 (1.160)	0.30714** (2.402)
ERR	---	0.45670 (0.576)	-0.32663 (-0.376)	0.41444* (1.881)
TTREND	0.24167 (1.008)	0.22391 (0.709)	0.015192 (0.201)	---
Fox_1	-0.46844** (-2.100)	-0.74252*** (3.308)	-0.77422** (-2.668)	0.67299*** (-2.864)
R ² Adj.	0.96	0.96	0.62	0.93

Notes: (i) The numbers in parentheses are asymptotic t-statistics;

(ii) *** Indicates significantly different from zero at 1% level.

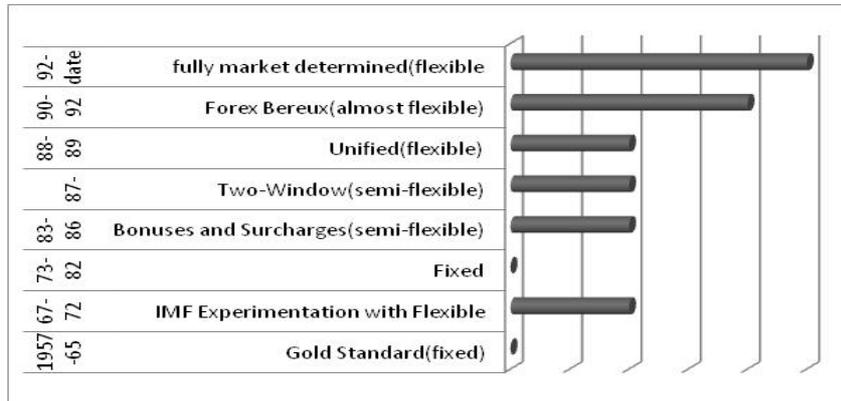
(iii) ** Indicates significantly different from zero at 5% level

* Indicates significantly different from zero at 10% level

^a The Null hypothesis is there is no serial correlation.

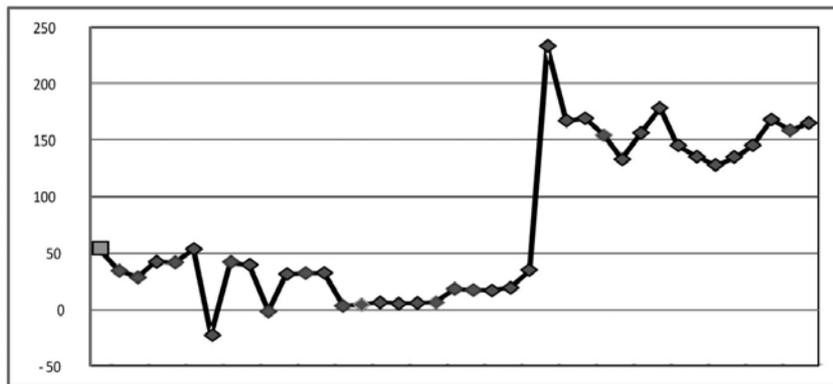
The critical value for Durbin-h statistic at 95% is 1.645

Regression 4 is the parsimonious equation



Source: Bank of Ghana, 2010

Figure 1.1. Ghana's Exchange Rate Regimes since 1957-date



Source: UNCTAD, FDI/TNC Database

Figure 1.2. FDI Trends in Ghana, 1970-2008 (Millions of dollars)