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Does Foreign Direct Investment Promote Economic Stability in Developing Countries?

by

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Abstract

Does foreign direct investment aid or hinder economic recovery ensuing a financial crisis? The paper tests the hypothesis that foreign direct investors are less affected by volatility (uncertainty) on their investment decisions. The data comes from the Business Enterprise and Economic Performance Surveys (BEEPS) collected by the World Bank. The investment data is applied using a Q model specification and sales growth data using a simple SCP model. The main finding is that foreign held firms are different from domestically held firms and especially domestically export active firms because of lower adjustment cost (which makes them continue to invest) during episodes of uncertainty.

JEL classification: F23, G01, L25, O12

Keywords: Foreign direct investment, volatility, firm-level investment, firm growth

Outline

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2. *Literature review*
3. *Data and methodology*
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Non-Technical Summary

The aftermath of financial crisis in developing Africa, Asia, Europe and Latin America opens the question whether foreign direct investment has aided or hindered the process of economic recovery in the implicated economies. This has led toward the formation of the hypothesis that foreign direct investors are more stable investors during episodes of uncertainty and crisis.

There exists some previous evidence in the literature of the stability hypothesis. However, no studies are available that quantitatively and comparatively assess the influence of volatility directly onto the adjustment cost of firms in an investment theoretical framework.

The stability hypothesis is tested in the paper using financial data collected with the Business Enterprise and Economic Performance Surveys (BEEPS) by the World Bank. The data covers the period 2002-2010 and includes up to 127 countries in the developing world. The repetition of surveys over time renders the data panel qualities. The investment data is applied using a Q model specification and sales growth data using a simple SCP model.

The findings confirm that foreign direct investors are different from domestic investors and especially domestic exporters because of lower adjustment cost (which makes them continue to invest) during episodes of uncertainty as measured with objective economic data (exchange rate volatility or inflation). With respect to sales growth as the dependent variable there is much weaker evidence to suggest that foreign direct investors are less susceptible to volatility on their sales growth function. As for the subjective measure of uncertainty collected with the BEEPS survey the findings suggest again that all domestic investors are much more susceptible to respond in their investment decisions to perceptions of local adverse economic developments.

An important policy implication of the study is that policies in developing countries seeking to rectify the imbalances experienced by different types of investors such as foreign and domestic should rather seek to eradicate the barriers facing the domestic firms than to erect new barriers towards the foreign firms.

1. Introduction

The paper sets out to investigate the hypothesis that foreign direct investors are more stable investors in developing countries and in particular during episodes of uncertainty. Such episodes may include exchange rate volatility, general internal macroeconomic instability because of inflation or regime changes. This 'stability hypothesis' emerged for the first time in the literature in the aftermath of the Asian Financial Crisis in the late 1990s (Lipsey, 2001). But the stabilising effect of foreign direct investment in the context of financial crisis or general economic uncertainty is often challenged in the literature (Aizenman, 2003, Lensink and Morrissey, 2006).

One version of the 'stability hypothesis' claims that it is the overlap between the investor and asset owner that makes foreign direct investors different from all other investors. However, the overlap between the investor and owner also applies to most of the domestically held firms in the economy and in particular in developing countries. Hence this version of the stability hypothesis is relevant only when understanding the differential impact that different foreign capital flows may have.

Another version holds that the true advantage of the foreign direct or multinational investors lies in their network and the flexibility and certainty that this network renders in terms of maintaining stable sales during crisis or episodes of uncertainty that are local in character (Lipsey, 2001).

Yet another version would relate the stability hypothesis directly to the lower adjustment cost of multinational firms. This scenario would apply to developing country where subsidiaries often have the proven technologies available from the 'shelf' making the investment process more certain.

It is the latter hypothesis that is tested in the present paper, by using the Q model as a theoretical tool to test whether uncertainty in general increases the adjustment cost of firms and whether this cost is higher comparatively among the domestic firms in the sampled countries. The results from the Q model are compared with a simple linear Structure-Conduct-Performance (SCP) model that explains sales growth of firms to estimate aspects in which the stability hypothesis is more realistic (investment, sales or both).

This research question has rarely been investigated in the literature on foreign direct investment and economic development. A seminal study by Robert Lipsey (2001) is the first available paper in the literature that quantitatively tests the stability hypothesis. Using US and Japanese establishment data in three financial crises, Lipsey (2001) finds some confirmation for the stability hypothesis. The available evidence suggests that foreign investors were more immune to the currency crisis that hit Latin American economies in the first part of the 1990s and the Asian economies in the late 1990s, because of their ability to switch between supplying the local and export markets.

Corroborating evidence is also reported by Alfaro and Chen (2010) even though that study focus explicitly on the responses in multinational firms to the global financial crisis. This study found that subsidiaries of foreign multinationals fared relatively better than their local counterparts in countries more adversely affected by the global crisis.

The stability hypothesis although still theoretically underexplored, can render potentially complementary explanations to the comparatively higher performance of foreign owned subsidiaries vis-à-vis domestic firms in developing countries (Moran et al., 2005). The stability hypothesis can help to explain why foreign firms expand while domestic firms contract during episodes of generally

low growth spells. Hence the stability hypothesis can add explanation to the apparent absence of technology spillovers from FDI in developing countries. Or add explanation to the apparent absence of a direct causality running from FDI to economic growth (Carkovic and Levine, 2005, Borensztein et al., 1998).

The challenge to research this question is to obtain comparable and reasonable quality financial data either for a sufficient cross section sample of countries or for a time series of firms within one country or both. The recently collected data from the Business Enterprise and Economic Performance Surveys (BEEPS) published online by the World Bank can help to shed light on this hypothesis for a fairly large sample of firms in developing countries across four world regions (Africa, Asia, Europe and Latin America). The data applied includes up to 130,303 firm-level observations across 127 countries over the period 2002-2010. The survey covers cross sections of firms. However, the multi-level character of the data including the repetition of surveys over time for many countries renders the data quality comparable to real panel data.

In the present study I focus on the investment behaviour of firms. The choice falls on investment behaviour because it is the most pro-cyclical of all fundamental macroeconomic factors in the business cycle. The results for investment behaviour are also compared with those for sales growth to test the adjustment cost up against the sales growth part of the stability hypothesis. The results obtained in the present paper render support for investment being the central transmission mechanism of uncertainty onto other firm performance variables such as sales growth. The paper shows that the differential reaction to uncertainty across the foreign and domestic firms is to be found more in their investment than in their sales growth function. Hence the results would suggest that the stability hypothesis has roots in the fundamental investment advantages of foreign owned subsidiaries and the advantage they have in terms of access to proven technologies.

For growth and development the present results imply that multinational firms have a very direct and stabilising effect on investment in volatile environments. The results also imply that countries that do not provide a stable economic environment put their own firms and especially their exporting firms at significant disadvantage up against multinational investors who are less likely to suffer from an adverse local economic environment.

2. Literature review

There is a large macroeconomic literature available on investment and uncertainty, whereas the micro econometric evidence using firm-level data until recently has been scant. First I relate to the main findings in the macroeconomic literature and then take a focus on the available evidence at the firm level. The section rounds of by discussing the literature that has explicitly focused on FDI and volatility.

2.1 Macroeconomic literature on investment and volatility

Ramey and Ramey (1995) offer one of the first papers on the negative relationship between volatility and economic growth. The authors propose in this work and based on their own investment theoretical framework that uncertainty may impose higher adjustment cost on firms. However, they fail at the macroeconomic level to trace any relationship between investment as a share of GDP and volatility, hence concluding that investment is not the likely transmission mechanism from volatility onto growth. As a reflection of this finding, the empirical literature is relatively silent on the relationship between investment and volatility. Aizenman and Marion (2003) found a significantly negative relationship between investment and volatility once the public share of investment had been reduced out of the aggregate macroeconomic data. Hence the authors conclude that the impact of volatility on investment should be much easier to detect using micro-level data.

Few studies are available for the firm level studying this particular question. Hence I identify in the literature review a number of other works that can be seen in one way or another related to this particular topic.

2.2 Micro level evidence

One important study in this respect was conducted by Nucci and Pozzolo (2006) using Italian firm-level data. The authors concluded that firms may respond in their investment function to volatility, however, the reaction depends on the characteristics of the firm and the direction of exchange rate volatility. Firms that were found to suffer most from exchange rate volatility on their investment decisions in Nucci and Pozzolo (2006) were firms with low monopoly power, subject to a higher degree of import competition and firms of small size.

Another important study was conducted by Lipsey (2001) across three financial and exchange rate crisis (1982, 1994 and 1997) for US and Japanese manufacturing FDI into the affected developing countries during the three crisis years. Even though data is scant for investment and only available with the two latter crisis years (1994 and 1997) Lipsey concludes that capital expenditure towards plant and equipment grew by at least 6 percentage after the crisis events in 9 of the affected economies (including Mexico and China) while it fell only in 3 (Hong Kong, Indonesia and Malaysia). The numbers reported by Lipsey (2001) are all aggregate country level averages and do not as in the present paper contain a comparative dimension to domestic investment behaviour.

Alfaro and Chen (2010) using a large scale firm-level dataset for before and after the 2008-09 global financial crisis found that the more adverse the local response was to the global crisis - the better was the relative performance of foreign owned subsidiaries relative to domestically held firms. The dependent variable in Alfaro and Chen's study is sales growth.

Related with the above literature is some micro level evidence that mainly confirms the negative link between volatility and growth. For example, Chong and Gradstein (2009) show using firm-level data from the BEEPS dataset that volatility or uncertainty as perceived by the firm itself is a significant factor hampering its growth rate. Demir (2010) shows for a large and long panel of Turkish firm that volatility was a retarding factor of employment growth in Turkey over the last three decades.

2.3 Foreign direct investment and volatility

Somewhat unrelated to the present study is the more aggregate type of studies that investigates cause-effect relationships between FDI and volatility (Lensink and Morrissey, 2006, Choong and Lion, 2009, Pain and Welsum, 2003 and Blonigen, 2005).These studies mainly call attention to the fact that there may exist an apriori relationship between FDI and volatility tending to deter foreign direct investors from the more volatile macroeconomic environments. (In the methodology section I use a simple data plot to show that the present sample does not seem to suffer from such a selection bias.)

Finally, a number of theoretical models are offered on FDI and volatility. Campa (1993) develops a model that incorporates the option value of waiting and shows that volatility may deter first time investor type of decisions. Goldberg and Kolstad's (1995) model looks at the investment decision from the perspective of the outward US investor and proposes that increased volatility may prompt more investment abroad rather than less. Aizenman (2003) offers the only model that is relevant also in a follow-up investment perspective (from the perspective that FDI is in fact a continuous process rather than a one-off type of event). This model shows that volatility in general gives incentive for diversification. The result of volatility is a more footloose investment environment where multinational firms can shift production and employment across their network in response to adverse local developments.

3. Data and Methodology

3.1 Data

The data is taken from the World Bank's *Business Enterprise and Economic Performance Surveys* (BEEPS). That data covers cross sections of firms in developing countries and emerging markets across the major regions of the world. (The data also includes a few EU countries such as Ireland, Germany and Greece.) A small part of the dataset is also available as a panel, but due to the significant reduction in sampled observations for the necessary data points that data is not explored in the present study.

The economic environment in many developing countries renders it often more difficult to get access to reliable firm-level data for research. The World Bank's firm-level surveys seek to remedy this situation by aiming at covering a representative population of firms in each country stratified by main characteristics such as size, industry and location. The data is collected through personal interviews conducted by World Bank personnel or representatives available on the ground in each country. Typically the surveys are conducted in the native language of each country. Often there is a regional focus in each survey year, e.g. one survey year covers Eastern Europe, another South Asia etc.

The paper is based on the combined comprehensive BEEPS datasets covering the period 2002-2005 and 2006-2010 respectively. It was possible to merge the two datasets each sampled on the essential

financial data points and other central data variables for the purposes of carrying out the present study. Thereby the dataset covers the full period 2002-2010 which is salient towards including episodes of uncertainty across the sampled countries. The total number of observations in the merged dataset is 130,303. However, because of the necessity to use financial data the effective number of observations is reduced to around one tenth of the full sample. Firms are less likely to give away financial information during interviews of this type, either because it is considered confidential or because respondents do not have the necessary variables readily available at the time of the interview.

The surveys produce a high number of variables (around 300) many of which are of a categorical nature. The variables used in the present study are listed in Table 1. All the variables refer to the firm level whereas only one category of variables is drawn from a country level dataset – namely the volatility variables. Furthermore the merging of country with firm level data gives the unique possibility to analyze uncertainty as a purely environment-specific or objective phenomenon up against the qualitative responses given by the interviewed managers, where the latter measures the managers' subjective perception of the level of uncertainty prevailing in their operating environment.

From the BEEPS dataset the most important variable in the study is the investment variable. This variable is captured in both a categorical and absolute way in the survey. Firms are first asked whether they did any investment at all in the previous fiscal year – this answer is measured with the variable called *Invest* in the study as listed in Table 1. The absolute measure or the size of investment is measured with the investment rate I/K and relates the absolute expenditure towards equipment, land and buildings in the fiscal year with the existing size of the capital stock (defined as equipment, land and buildings) of the firm. The *Invest* variable is used to increase valid responses for the investment rate variable *I/K*. All variables taken from the BEEPS survey are drawn or manipulated so that they avoid forth-running data series expressed in local currency and inflation is altogether reduced out in this manner. Only the sales growth variable needed to be deflated.

Table 1: Study variables

Variable	Explanatory notes
Age_{cit}	The age of the firm, measured as the year of the survey less the year of establishment.
$Competition_{cit}$	Number of immediate competitors at the main product level as identified by the firm itself, measured with a categorical scale (1=0 competitors, 2=1 competitor, 3=more than 1 competitor 4=more than 5 competitors).
$Country_{cit}$	The country in which the i'th firm is located.
g_Labor_{cit}	Growth in employment over the three year period leading up to the fiscal year.
$Exporter_{cit}$	A dummy that takes the value of 1 when the firm is export active.
$Foreign_{cit}$	A dummy that takes the value of 1 when more than 10% of the firm is held by owners abroad.
$Invest_{cit}$	A dummy that takes the value of 1 if the firm undertook any investment at all and 0 otherwise.
I/K_{cit}	The rate of investment measured as total expenditure for purchase of equipment, land and buildings divided with the book value of equipment, land and buildings. When the variable *Invest* takes the value zero this variable is programmed to zero investment.
$Leverage_{cit}$	The ratio between debt finance (bank and other loans) and internal funds (including retained earnings and equity), the ratio is calculated as: (1-internal funding)/internal funding.
$Majority_{cit}$	Concentration of ownership, estimated as the percentage of shares held by the largest single owner.
Q_{cit}	Tobin's Q – estimated assuming a risk free going interest rate at 0.05 percentage - by dividing ROA with the going interest rate.
ROA_{cit}	Return on assets, calculated as total sales less accounting cost and divided with the cost of replacement of equipment, land and buildings.
g_Sales_{cit}	The growth rate in sales over the last three year period measured as difference between the logarithm to sales at times t2 and time t0 – where t2 is the fiscal year. The sales data in local currency units is deflated back to time t0 using information about the average year-on-year inflation over the same three year period as measured with the Consumer Price Index in the *Global Economic Monitor* databank published by the World Bank.
$Size_{cit}$	A categorical variable that takes the value 1 for micro (<5 employees), 2 for small (<20 employees), 3 for medium (<100 employees) and 4 (100 and above) for large firms.
$State_{cit}$	A dummy that takes the value of 1 when more than 10% of the firm is held by the state.
Vol_HL_{ct}	A dummy that takes the value of 1 when the volatility in the nominal USD exchange rate is unusually high – e.g. exceeds the third quartile for the SD distribution.
Vol_INFL_{ct}	The standard deviation for a 24 month period (fiscal year and year preceding the fiscal year) in the monthly percentage change in the Consumer Price Index. The data is taken from the *Global Economic Monitor* databank as published by the World Bank at www.worldbank.org.
Vol_SUB_{cit}	Subjective volatility – e.g. the firm's own perception of macroeconomic political instability as measured on a likert scale from 0-4 in the BEEPS dataset. The dummy takes the value of 1 when the firm chooses 3 or 4 on the likert scale. There is some variation in the question asked the firms over the years – until 2005 (using the 2002 version of the survey) the firms answered the following question: 'Please tell us if any of the following issues are a problem for the operation and growth of your business. If an issue poses a problem, please judge its severity as an obstacle on a four-point scale – 0=No obstacle, 1=Minor obstacle, 2=Moderate obstacle, 3=Major obstacle, 4=Very severe obstacle - N. macroeconomic Instability (inflation, exchange rate)?'. After 2005 (using the 2007 version of the survey) the question becomes instead: 'As I list some of many factors that can affect the current operations of a business, please look at this card and tell me if you think each factor is No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) – e. Political Instability?'
Vol_RER_{ct}	The standard deviation for a 24 month period (fiscal year and year preceding the fiscal year) in the monthly percentage change in the real exchange rate. The data is taken from the *Global Economic Monitor* databank as published by the World Bank at www.worldbank.org.
Vol_USD_{ct}	The standard deviation for a 24 month period (fiscal year and year preceding the fiscal year) in the monthly percentage change in the nominal USD exchange rate quoted in local currency units. The data is taken from the *Global Economic Monitor* databank as published by the World Bank at www.worldbank.org.
$Year_{cit}$	Fiscal year = year of the survey (observation year) minus 1.

Source: All data and definitions are taken or arrived at from the World Bank's *Business Enterprise and Economic Performance Surveys* if not otherwise mentioned as published on the website: www.enterprisesurveys.org

3.2 Measuring volatility

Most available studies of exchange rate volatility rely on the real exchange rate since it is the most superior basket measure of exchange rate developments. It takes into account all the main currencies of the trading country and is also cleansed for differential inflationary levels in trading and partner countries (see for example Kenen and Rodrik, 1986, Demir, 2010).

In a firm level perspective it is difficult to say if it is the best measure of volatility. The best measure would in this study be the real exchange rate as seen from the perspective of the firm and not the country. In several ways the USD exchange rate may not be an unreasonable yardstick currency to use and especially for developing countries and emerging markets. Many firms still rely on the USD as their main trading currency and it continues to be the main holding currency among non-US residents in the global economy. The nominal USD exchange rate as expressed in Local Currency Units is chosen in the present study as the main variable on which the calculated measure of volatility is based. This variable is available in the *Global Economic Monitor* dataset published by the World Bank for more than 95 percent of the firm-year observations in the BEEPS dataset. Oppositely is the real exchange rate only available for less than 50 percent of the firm-year observations in the BEEPS dataset simply because the variable is not possible to calculate for a relatively high number of developing countries due to inadequate information about the underlying variables that make up the real exchange rate (such as the exact composition of the export and import basket among trading partners).

The specific measures of volatility as adopted in the regression analysis are calculated with base in one of these two exchange rates. Volatility aiming at comparing a cross section of countries according to the preferred specifications in Kenen and Rodrik (1986) is best measured as the standard deviation in the period specific 24-monthly or bi-annual monthly percentage changes in the exchange rate.

Other measures of volatility are also tried out. As an alternative to exchange rate volatility, inflation is chosen as a general price indicator of volatility measured again as the standard deviation in the bi-annual percentage change in the monthly inflation rate to make the measure comparable for a cross section or panel of firm-country observations. Finally, subjective volatility as perceived by the firm on a likert scale from 0 to 4 is also included as an alternative measure to the other country-specific or objective measures. The subjective measure may reveal for example whether some types of firms are less perceptive of volatility relative to other firms and hence indicate if differences in agency arise mainly as a psychological rather than circumstantially constrained response to the external environment.

3.3 The ownership variable and endogenous foreign direct investment

One advantage of the BEEPS dataset is that it records ownership on the categories of domestic, foreign and state in terms of percentage shareholdings respectively. State owned firms constitute only a small share of the sampled firms and information about state owned firms had little bearing on the final results which is why it has been left out.

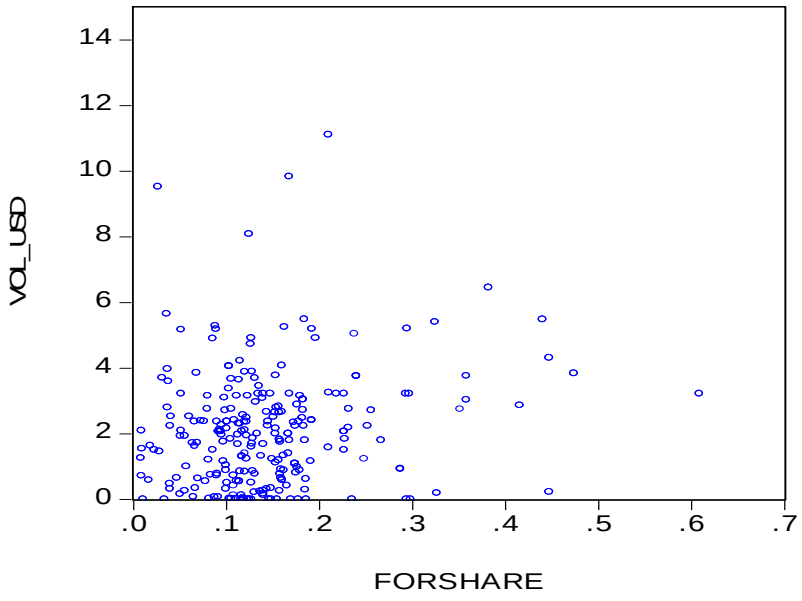
The study follows the standard definition of FDI being foreign shareholdings of above 10% according to the International Monetary Fund.

A major methodological problem in the study as already introduced in the literature review refers to the classical problem of what is going on at the macroeconomic and microeconomic level respectively once one starts to combine data for different units such as firms and countries.

The investigation of the hypothesis that foreign investors in emerging markets and developing countries are relatively more insulated from volatility or uncertainty on their performance from a cross-country perspective may be hindered by an endogeneity problem. It may be that foreign direct investment is much less common in high volatility environments. This problem may work to reduce the number of firm level observations in high volatility environments and hence thus also produce a bias in favor of wrongly confirming the hypothesis (simply because foreign ownership is more prevalent in low volatility environments and also because it may be the more risk willing foreign direct investors that decide to invest in the more volatile markets).

Assuming that foreign investors are as likely as any other firm to respond to the World Bank survey and given that the survey is stratified to reflect the underlying firm populations, it can be verified from Figure 1 that the data does not immediately appear to suffer from such a bias. There is found to be no significant negative or positive correlation between the share of foreign firms and the preferred measure of volatility based on the nominal USD exchange rate.

Figure 1: Volatility and the share of foreign ownership in the sampled countries



Source: The World Bank, comprehensive BEEPS datasets, downloadable at www.enterprisesurveys.org

3.4 Choice of econometric models

This section introduces briefly the econometric models to be estimated in the subsequent sections of the paper.

3.4.1 The investment equation (the Q model)

The investment equation to be estimated takes outset in the neoclassical q-theory, where investments are fundamentally seen to be driven by profitability. (In a cross-country perspective with differentially distributed comparative advantages, industry may oppositely be a poor explanatory factor of performance.) Important assumptions of the Q model are that investments are convex in firm value (profitability) and that all firms in the long run tend towards a competitive state. For example, the assumption that the firm will continue to invest as long as Q is greater than 1 (see below) is not relevant for a firm operating as a monopolist. This is one reason why the investment rate may have a common national element that is in part determined by factors such as competition and credit institutions. Hence the assumption is in part controlled for by using country dummies.

The study adopts some variation on the orthodox approach to the q-theory of investment (for an overview of the micro-econometric investment literature see Bond and Renen, 2007). First of all is it not possible to measure q in its exact form (as market value over book value), simply because the market value of most firms in emerging and developing economies is an unknown variable or it is not measured with the BEEPS survey. Secondly the accounting version of q typically requires some comparison of profitability with opportunity cost such as the going rate of interest in the local market. But in the type of markets investigated in this paper it is close to impossible to obtain reasonable estimates of the real interest rate and/or the real interest rate is likely to be highly correlated with the measures of volatility used in the paper. Hence Q is estimated by using 5 percent as a general discounting factor across all firms. This is similar to just adopting ROA. However, in the spirit of the Q model it is necessary to obtain a direct approximation to Q.

$$\log I/K_{ict} = \alpha_0 + \beta_o \log Q_{ict} + \beta_1 Vol\_USD^* \log Q_{ict} + \beta_2 age^* \log Q_{ict} + \beta_3 \text{exporter}^* \log Q_{ict} + \chi_k K_{i_{ict}} + \varepsilon_{ict} \quad \text{(Eq 1)}$$

Following the Q model specification, investment is explained as driven by the fundamental value of the firm which is determined in the present study alone by its current profitability. This implies that as long as the return from investing is above the going rate of interest there are unexplored investment opportunities with the firm. The investment process will continue until Q tends towards 1 and no further excess profits can be extracted from the firm. In this simple form the estimated coefficient (β0) is an estimate of the adjustment cost which are defined to C = 1/ β. The adjustment cost measure the periods it takes until the fundamental value of the firm is realized at the current rate of investment. The adjustment cost is higher the lower is the estimated coefficient on Q.

The Q model is expanded to account for adjustment cost that are specific to the macroeconomic environment (the volatility measure) as measured with β1 and firm specific factors such as the age of the firm (β2) and whether the firm is an exporter (β3).

The model is expanded additively (C = 1/ β0+1/ β1+1/ β2 etc.), meaning that additional adjustment cost are interpreted as additive elements onto the original adjustment cost. For example, if β2 is positive, a higher age then represents an additional adjustment cost, or conversely if negative a higher age then represents a reduction in adjustment cost etc. At the same time if β is estimated to be higher for one group of firms relative to another, it implies that the adjustment cost C for that group of firms is lower. In addition to these explanatory factors, controls are added for firm size, observation year and country.

Finally, by expanding Equation 1 with ownership groups it is possible to test the stability hypothesis that: β1(FOR)> β1(DOM) which is equivalent to C1(FOR)<C1(DOM).

Equation 1 as stated above makes sense from an econometric viewpoint only as long as it is stated in a panel data form (with several observations for individuals or firms *i* over time *t*). Implemented on cross sections of data (e.g. data for which every firm *i* is only observed once) it can only be estimated with a limited number of country-specific factor as these will otherwise become collinear. This is the classical omitted variables problem that cross sectional studies face. However, owing to the multilevel character of the data (e.g. groups of firms *i* belonging to particular countries *c* that are sampled several times) there is some flexibility to include country-specific variable relative to the very traditional cross sectional studies.

Another general problem of estimating investment equations is due to the censoring problem. Many firms do typically not incur any investments for several years and then may incur a very high level of investment in one particular year. This is considered as belonging to the group of econometric challenges called censoring even though Wooldridge (2002) notes that it is really a corner type of solution problem (Wooldridge, 2002, p518). There are different strategies to overcome this problem. One strategy is instead to model on the binary variable *Invest* using a logit model to estimate the same parameters as in Equation 1 above, however, changing the dependent variable to the probability of whether the firm invests at all: *Prob (Invest>0)*.

An alternative strategy is to use a Tobit censoring model whereby both the binary information and the actual investment data information is used towards estimating the parameters. Either of the other alternatives (pure OLS or logit) may lead to biased estimates and in particular in the present context underestimate the parameters β in Equation 1. Under this strategy the model choice for Equation 1 takes the following form now:

$$LogI/K_{ict}^{*} = \alpha_0 + \beta_o \log Q_{ict} + \beta_1 Vol\_USD^{*} \log Q_{ict} + \beta_2 age^{*} \log Q_{ict} + \beta_3 \text{exporter}^{*} \log Q_{ict} + \chi_k K_{i_{ict}} + \varepsilon_{ict}$$

$$LogI/K_{ict} = Max(0, LogI/K_{ict}^{*})$$

(Eq 2)

3.4.2 The Structure-Conduct-Performance (SCP) model

In complement to the estimation of the investment equation, an SCP type of model is estimated towards explaining sales growth. As in the Q model, the specific industry plays little role towards explaining performance[1] – rather performance is driven by market structure which in terms of the financial data is given as a snapshot in time through existing firm size distributions and the degree of prevailing competition. Again is the main purpose to test the hypothesis that sales growth with foreign subsidiaries is more stable during episodes of uncertainty.

The following equation for sales growth is tested, where once account has been made for the growth trajectory of the individual firm (by making firm growth path dependent through the inclusion of sales at time t0) the degree of competition faced by the firm is assumed to be the main explanatory factor of sales growth (expectation is that β0>0 – since a higher number of competitors is more likely *inter alia* to push firms down their average cost curve towards the competitive equilibrium and assuming that firms choose quantities and compete in Cournot), in addition the same explanatory factors as for the investment equation are assumed:

$$g\_sales_{ict} = \alpha_0 + \alpha_1 sales0_{ict} + \beta_0 competition_{ict} + \beta_1 Vol\_USD_{ct} + \beta_2 age_{ict} + \beta_3 exporter_{ict} + \chi_k K_{ict} + \varepsilon_{ict} \quad \text{(Eq 3)}$$

Equation 3 is also expanded (although here only locally) by ownership group to test the hypothesis that foreign owned firms are more insulated from volatility on their sales growth performance (again β1(FOR)> β1(DOM) but where a negative sign is now expected for β1).

4. Regression results

In this section are reported the results from running the Q model (Regression Tables 1, 1b and 2) and the SCP model (Regression Tables 3 and 3b) on the available financial data for firms in developing countries.

4.1 Overview

In regression Table 1 the basic Q model is estimated with outset in the preferred measure for uncertainty or volatility *Vol_USD*. Table 1b is a variation on these results adopting the preferred speciation that came out of Table 1, but now changing the way that uncertainty or volatility is measured. Besides using the standard deviation in the percentage change in the nominal USD exchange rate as a forthrunning *Vol_USD* or categorical variable *Vol_HL*, volatility is also measured by using the real exchange rate *Vol_RER*, inflation *Vol_INFL* or the perception of volatility with individual survey respondents (managers) *Vol_SUB*.

As discussed above in the methodology section different statistical methods may with advantage be applied to estimate the equations to check for the influence that different methods have on the results. OLS is used in Regression Tables 1 and 1b. The results in regression Table 2 is a repetition of the results in Table 1b using instead of OLS the Tobit estimator. (The Tobit estimator corrects for the censoring bias that many firms report zero investments in a particular year.)

[1] As with the Q model there are also other complementary reasons for leaving out industry as an explanatory factor. For example, the firms modeled are embedded in industries with differential comparative advantage in a cross-country perspective.

Table 3 and 3b reports similar results from the standard sales growth equation first with the preferred volatility measure in Table 3 and in Table 3b using the different variations for measuring volatility in the study.

Throughout the tables controls are made typically for an increasing number of factors when reading the result's columns from the left towards the right. In the basic model adjustment cost are assumed to vary with volatility, the age of the firm and whether the firm is an exporter or not.

4.2 Results from estimating the Q model

The base Q model fits the data quite well as all the estimated coefficients are all significant. However, a large part of the variation in the data remains unexplained due to the very heterogeneous nature of the sampled data. This is in part compensated by adding controls for firm size, year of observation and country as the model is developed through Table 1.

Table 1, first column shows the standard result without ownership effects from applying the Q model to the data.

According to the base model results, a 1 percentage increase in the fundamental value of an average firm increases its investment rate with 0.05 percent. This is an estimate of basic adjustment cost – meaning that it will take 20 periods (here years) before the fundamental value of the average firm is realised. Volatility adds to the adjustment cost of an average firm, postponing the realisation of the fundamental value long into the future. Firms in this cross section sample have lower adjustment cost the older they are on average. Exporters are found to have higher adjustment cost which also owes to the fact that exporters have a much higher fundamental value (see also the Pearson correlation coefficients reported in the appendix Table A3).

In the second column the sample is divided into ownership groups. Alternatively individual equations could have been estimated by ownership group. However, from an econometric viewpoint as long as the error terms are i.i.d. over the two groups in the base specification it is considered more efficient to run the regression for by groups using the same equation. The test statistic of this assumption is reported in the last row of Table 1. (This test statistic gives the probability of wrongly accepting the H0 that the error terms are i.i.d. across ownership groups.) The results barely lead to an acceptance of the hypothesis for the mean of the errors, whereas it is accepted at the 1 percent level for the variance.

Comparing the results across ownership groups in the base equation gives the result that foreign and domestic firms vary mostly in the aspect of their fundamental adjustment cost. It is found that on average, adjustment cost in foreign firms are half those that prevail in domestic firms (note that a relatively higher coefficient implies smaller adjustment cost). This means in practise that they will be able to realise their fundamental value and reach their optimal size in about half the time as their domestic counterparts.

Regression Table 1 – Base model

Model:		**Q-model**	**Q-model**	**Q-model**	**Q-model**	**Q-model**
Equation number:		1.1	1.2	1.3	1.4	1.5
Method:		OLS	OLS	OLS	OLS	OLS
Dependent Variable:		Log (I/K)	Log (I/K)	Log (I/K)	Log (I/K)	Log (I/K)
Explanatory Variables						
Intercept	DOM	0.047 (7.26)	0.056 (8.06)	-0.039 (-0.82)	-0.064 (-1.29)	0.107 (1.00)
	FOR		-0.021 (-1.06)	-0.131 (-2.50)	-0.153 (-2.84)	0.012 (0.12)
Log (Q)	DOM	0.048 (13.90)	0.044 (11.53)	0.047 (12.13)	0.042 (10.64)	0.034 (7.36)
	FOR		0.080 (7.63)	0.082 (7.70)	0.069 (6.42)	0.068 (6.30)
Log (Q)*Vol_USD	DOM	0.009 (11.53)	0.010 (10.84)	0.009 (10.01)	0.009 (9.02)	-0.001 (-0.75)
	FOR		0.012 (5.29)	0.012 (5.31)	0.014 (6.20)	0.008 (3.13)
Log (Q)*Age	DOM	-0.0003 (-4.01)	-0.0002 (-3.017)	-0.0003 (-3.41)	-0.0002 (-2.25)	-0.0001 (-1.49)
	FOR		-0.0004 (-2.26)	-0.0005 (-2.46)	-0.0004 (-1.86)	-0.0002 (-1.19)
Log (Q)*EXP	DOM	0.027 (9.05)	0.022 (6.05)	0.019 (5.00)	0.016 (4.28)	0.024 (6.46)
	FOR		0.020 (2.73)	0.017 (2.28)	0.012 (1.66)	0.002 (0.38)
Control Variables						
Size	S	-	-	0.086 (1.77)	0.005 (0.10)	-0.002 (-0.04)
	M			0.101 (2.08)	0.017 (0.32)	0.021 (0.41)
	L			0.129 (2.62)	0.040 (0.74)	0.041 (0.76)
Year		-	-	-	Yes***	Yes
Country		-	-	-	-	Yes
Number of observations		16,448	16,182	15,960	15,960	15,960
R^2		0.10	0.20	0.21	0.22	0.25
H0: errors are i.i.d by ownership		μ (0.10)* σ (0.00)***				

There is also some difference in adjustment cost with respect to volatility in the base equation. The results render a smaller difference here by ownership than for the fundamental adjustment cost. Across most of the specifications it is found that domestic firms are more susceptible to adjustment cost caused by volatility or uncertainty. But there is great variation across the results with how much volatility matters to the difference in adjustment cost across the two groups.

The last three columns in Table 1 add controls for firm size, observation year and country respectively. Although these controls are generally not very significant once all of them have been included they contribute greatly to increase the explanatory power of the Q model for the sample. That is not surprising since firms producing across four widely different continents in countries at dissimilar levels of development are compared. With these additional controls it is possible to explain 25 percentage of the variation in the data sample on investment behaviour which is quite good since few papers report even for single country studies an R^2 of this size when focusing on investment (Bond and Reenen, 2007).

The results by adding this element are shown in Regression Table 1b. The results confirm that once an interaction term is added between volatility and export propensity this becomes the overriding influence of additional adjustment cost faced by firms besides fundamental adjustment cost.

Regression Table 1b – Preferred base model with different measures of volatility

Model:		**Q-model**	**Q-model**	**Q-model**	**Q-model**	**Q-model**
Equation number:		1.6	1.7	1.8	1.9	1.10
Method:		OLS	OLS	OLS	OLS	OLS
Dependent Variable:		Log (I/K)	Log (I/K)	Log (I/K)	Log (I/K)	Log (I/K)
Volatility measure:		Vol_USD	Vol_HL	Vol_RER	Vol_INFL	Vol_SUB
Explanatory Variables						
Intercept	DOM	0.106 (0.98)	0.106 (0.98)	0.393 (1.49)	-0.083 (-0.61)	0.135 (4.68)
	FOR	0.012 (0.11)	0.021 (0.20)	0.250 (0.94)	-0.226 (-1.60)	-
Log (Q)	DOM	0.038 (8.02)	0.036 (9.67)	0.032 (7.53)	0.040 (6.49)	0.022 (5.13)
	FOR	0.089 (6.73)	0.084 (8.15)	0.110 (9.55)	0.111 (9.07)	0.107 (9.31)
Log (Q)*Vol_	DOM	-0.002 (1.83)	-0.009 (-1.76)	-0.000 (-0.80)	-0.002 (-1.75)	0.029 (5.73)
	FOR	-0.000 (-0.09)	0.004 (0.36)	-0.000 (-2.64)	-0.000 (-2.76)	-0.000 (-2.45)
Log (Q)*Age	DOM	-0.000 (-1.43)	-0.000 (-1.47)	-0.000 (-1.07)	-0.000 (-0.86)	-0.000 (-0.90)
	FOR	-0.000 (-1.08)	-0.000 (-1.19)	-0.000 (-0.95)	-0.000 (-0.83)	-0.000 (-0.94)
Log (Q)*EXP	DOM	0.003 (0.43)	0.009 (1.75)	0.018 (1.93)	0.013 (1.56)	0.039 (7.25)
	FOR	-0.033 (-2.26)	-0.019 (-1.92)	-0.004 (-0.47)	-0.023 (-1.74)	0.000 (0.01)
Log (Q)*Vol_*EXP	DOM	0.008 (3.56)	0.032 (4.35)	0.004 (1.36)	0.005 (2.12)	-0.031 (-3.29)
	FOR	0.013 (2.85)	0.049 (3.25)	0.001 (1.25)	0.008 (2.60)	-0.004 (-0.35)
Control Variables						
Size	S	-0.001 (-0.02)	-0.001 (-0.02)	0.001 (0.02)	0.025 (0.22)	0.005 (0.05)
	M	0.023 (0.44)	0.023 (0.43)	0.041 (0.41)	0.067 (0.58)	0.045 (0.45)
	L	0.042 (0.78)	0.043 (0.79)	0.064 (0.63)	0.092 (0.79)	0.066 (0.65)
Year		Yes	Yes	Yes	Yes***	Yes
Country		Yes	Yes	Yes	Yes***	Yes
Number of observations		15,960	15,960	11,134	10,439	10,901
R^2		0.25	0.25	0.26	0.26	0.27

Foreign export active firms are now much less susceptible to volatility when compared with domestic export active firms. And oppositely for all non-exporters the type of volatility generated by exchange rate uncertainty matters little to their adjustment cost. Hence the additional interaction term is necessary in order to interpret the results also for different types of uncertainty. For example, it may be that this effect is only due to the fact that we measure uncertainty with exchange rate volatility.

Adding controls to the Q model does not have major repercussions for the results with regard to the fundamental adjustment cost. However, the results for the impact of volatility on adjustment cost with domestic firms changes sign and loses significance in the last column in Regression Table 1. Whereas for the foreign group of firms it is the exporter specific element to adjustment cost that loses size and significance. These two results in combination suggest that once controls especially for countries (capturing institutions including openness to trade) are included, there may be a cross-correlation by ownership and export propensity. For example, it raises the question whether the results for volatility and ownership needs to be cross-referenced for export propensity, because most foreign firms are export active whereas domestic firms are not.

This is done in Table 1b, first column. These results show that with respect to exchange rate volatility related adjustment cost the best comparison groups are export active firms of foreign and domestic origin. Now adjustments cost with domestic firms alone because of volatility are 30-50% higher compared with the same cost in foreign firms.

Subsequent columns in Table 1b render results from adopting alternative volatility measures to the preferred base specification model in Column 1 (Eq 1.6). Throughout the table the result that foreign owned firms have generally lower adjustment cost is maintained and for some volatility measures such as those capturing the perceptions of respondents (rather than volatility objectively measured with environmental variables), the difference in fundamental adjustment cost becomes as high as 5 across ownership groups. Similar results as for the preferred volatility measure are obtained when instead measuring volatility again using the nominal USD exchange rate but instead adopting a categorical scale of low and high volatility *Vol_HL*. The real exchange rate *Vol_RER* renders lesser sized and significant results for the volatility variable, in part because of the sample selection involved in using more advanced measures of exchange rates as discussed earlier.

Regression Table 2 – Preferred specification with Tobit estimator

Model:		**Q-model**	**Q-model**	**Q-model**	**Q-model**	**Q-model**
Equation number:		2.1	2.2	2.3	2.4	2.5
Method:		Tobit	Tobit	Tobit	Tobit	Tobit
Dependent Variable:		Log (I/K)	Log (I/K)	Log (I/K)	Log (I/K)	Log (I/K)
Volatility measure:		Vol_USD	Vol_HL	Vol_RER	Vol_INFL	Vol_SUB
Explanatory Variables						
Intercept	DOM	-0.488 (-2.58)	-0.493 (-2.60)	-0.034 (-0.08)	-0.868 (3.51)	0.079 (1.68)
	FOR	-0.527 (-2.76)	-0.523 (-2.73)	-0.120 (-0.28)	-0.941 (-3.74)	-
Log (Q)	DOM	0.071 (8.45)	0.067 (10.22)	0.060 (8.21)	0.073 (6.78)	0.044 (5.91)
	FOR	0.110 (5.07)	0.106 (6.23)	0.129 (7.07)	0.126 (6.57)	0.125 (6.85)
Log (Q)*Vol_	DOM	-0.004 (-1.79)	-0.017 (-1.79)	-0.000 (1.48)	-0.004 (-1.75)	0.041 (4.84)
	FOR	-0.001 (-0.18)	-0.001 (-0.09)	-0.000 (-2.37)	-0.000 (-2.42)	-0.000 (-2.31)
Log (Q)*Age	DOM	-0.000 (-1.95)	-0.000 (-1.97)	-0.000 (-1.43)	-0.000 (-1.14)	-0.000 (-1.24)
	FOR	-0.000 (-0.40)	-0.000 (-0.42)	-0.000 (-0.17)	-0.000 (-0.19)	-0.000 (-0.13)
Log (Q)*EXP	DOM	0.004 (0.40)	0.013 (1.58)	0.028 (1.90)	0.026 (1.94)	0.053 (6.24)
	FOR	-0.036 (1.50)	-0.021 (-1.24)	-0.002 (-0.13)	-0.011 (-0.55)	-0.000 (-0.02)
Log (Q)*Vol_*EXP	DOM	0.010 (2.87)	0.040 (3.35)	0.004 (0.91)	0.004 (0.95)	-0.042 (-2.79)
	FOR	0.015 (1.95)	0.053 (2.16)	0.001 (0.66)	0.006 (1.17)	0.003 (0.21)
Control Variables						
Size	S	0.006 (0.007)	0.005 (0.06)	0.110 (0.60)	0.180 (0.84)	0.110 (0.21)
	M	0.182 (1.86)	0.180 (1.85)	0.329 (1.79)	0.410 (1.90)	0.327 (1.79)
	L	0.325 (3.30)	0.324 (3.30)	0.473 (2.56)	0.557 (2.58)	0.470 (2.57)
Year		Yes	Yes	Yes	Yes**	Yes**
Country		Yes	Yes*	Yes*	Yes*	Yes**
Number of observations		15,960	15,960	11,134	10,439	10,901
Log likelihood		-14,823	-14,820	-10,840	-10,285	-10,561

As for subjective volatility this measure is found to generate adjustment cost mainly among the domestically owned firms. This result strengthens the idea that adjustment cost or elements hereof are associated with firm internal factors such as uncertainty about adopting new technologies among local managers in developing countries. Even though the managers in the foreign subsidiaries are maybe equally as concerned about political instability or macroeconomic uncertainty as their domestic peers, it does not add to the actual adjustment cost incurred by the foreign owned subsidiaries when executing their investment plans.

The same results reported in Table 1b are replicated in Table 2, but now instead using the Tobit estimator to account for the bias that censoring may have on the OLS results.

The main results from the previous table are maintained by instead adopting the Tobit estimator. One quantitative difference is that firm size regains in importance and also the other control variables are generally found to increase in their explanatory power by using the Tobit estimator. Instead the difference in adjustment cost across ownership groups narrows somewhat but the qualitative difference is maintained. Again is it found that domestic firms have higher adjustment cost in general, and more so during episodes of uncertainty. However, for the inflation-based *Vol_INFL* and subjective measures of volatility *Vol_SUB*, this result is much weaker and not in direct accordance with the stability hypothesis. Yet again does subjective uncertainty appear to be a hampering factor for investment with domestic firms, whereas the foreign owned firms are not affected in terms of their investment decisions by these perceptions.

4.2 Results from estimating the SCP model

The results from estimating the SCP model are shown in Table 3. This is only a partly expanded model where the hypothesis that foreign firms are less affected by volatility on their sales growth is tested. The model explains only less than 10 percent of the variation in sales growth until country dummies are added. Also several variables change sign and significance when country dummies are included. Overall, results without the country dummies are considered less reliable why in the interpretation focus in on the preferred specification with all controls included in the last column of Regression Table 3. Competition is verified here to have a positive influence on sales growth as hypothesised with the SCP model. Age was tried out as a linear and parabolic influence on sales growth. Age is generally found to have a negative influence on sales growth also when controlling for the initial sales level at time t0. The results confirm the 'good dinosaur' effect of age on sales growth. The firms that survive over time are generally the strongest that continue to exhibit good performance. Exporters and subsidiaries of foreign multinationals have generally higher sales growth where both factors should be seen as additive elements towards understanding sales growth. Larger sized firms also have higher sales growth (again when controlling for the initial sales level of the individual firm at time t0). Volatility is found to have a negative influence on sales growth, however, the parameters for the two groups of ownership – domestic and foreign – are found to be almost identical. Hence even though foreign firms are found to have generally higher sales growth we can reject the proposition that they are more insulated from adverse effects of uncertainty or volatility on their sales growth function as an isolating factor.

Regression Table 3 – Structure-Conduct-Performance model

Model:		**SCP**	**SCP**	**SCP**	**SCP**	**SCP**
Equation number:		3.1	3.2	3.3	3.4	3.5
Method:		OLS	OLS	OLS	OLS	OLS
Dependent Variable:		g_Sales	g_Sales	g_Sales	g_Sales	g_Sales
Explanatory Variables						
Intercept		0.879 (20.35)	0.882 (20.33)	0.624 (8.38)	0.933 (12.67)	5.31 (31.89)
Sales at t0		-0.037 (-22.86)	-0.037 (-22.87)	-0.040 (-23.98)	-0.109 (-44.33)	-0.273 (-69.08)
Competition	=1	-0.196 (-4.35)	-0.196 (-4.35)	-0.193 (-4.25)	-0.038 (-0.87)	0.034 (0.83)
	>1	-0.085 (-2.36)	-0.085 (-2.35)	-0.084 (-2.33)	-0.004 (-0.14)	0.078 (2.38)
	>5	-0.102 (-2.92)	-0.102 (-2.92)	-0.099 (-2.85)	-0.009 (-0.27)	0.043 (1.36)
Vol_USD	DOM	0.019 (4.60)	0.018 (4.11)	0.020 (4.69)	0.033 (7.03)	-0.123 (-8.02)
	FOR		0.026 (2.35)	0.032 (2.79)	0.028 (2.46)	-0.118 (-6.45)
Age		-0.008 (-9.42)	-0.008 (-9.44)	-0.009 (-10.09)	-0.010 (-11.49)	-0.004 (-4.93)
Age^2		0.000 (7.54)	0.000 (7.54)	0.000 (7.79)	0.000 (8.42)	0.000 (4.89)
Export		0.076 (4.56)	0.076 (4.58)	0.046 (2.59)	0.109 (6.18)	0.233 (13.59)
Foreign		0.056 (2.64)	0.038 (1.18)	0.010 (0.33)	0.119 (3.66)	0.245 (7.92)
Control Variables						
Size	S	-	-	0.274 (4.15)	0.034 (0.52)	0.110 (1.72)
	M			0.332 (5.00)	0.243 (3.72)	0.582 (9.03)
	L			0.387 (5.71)	0.478 (7.21)	1.095 (16.48)
Year		-	-	-	Yes***	Yes***
Country		-	-	-	-	Yes**
Number of observations		22,065	22,065	21,729	21,729	21,729
R^2		0.03	0.03	0.03	0.09	0.22

The results for the preferred measure of volatility *Vol_USD* are repeated in Table 3b and the same specification is adopted for the other measures of volatility. The results are modified when jumping to the categorical measure for volatility *Vol_HL* which also takes outset in the preferred measure of volatility being the changes in the nominal US dollar exchange rate over time. For this volatility measure is detected some difference across ownership groups in their response to volatility for sales growth. In very high volatility environments domestic firms are more likely to experience a decline in their sales growth. The real exchange rate rendered again highly different results, where changes in the real exchange rate had a very small but highly significant and positive effect on sales growth. For the inflation based volatility measure *Vol_INFL* similar results as for the preferred measure were obtained, with few differences across ownership groups in terms of the sensitivity of their sales growth function to uncertainty. For the subjective measure of volatility *Vol_SUB* this measure could not be detected to have much bearing on sales growth.

Regression Table 3b – SCP model with different measures of volatility

Model:		**SCP**	**SCP**	**SCP**	**SCP**	**SCP**
Equation number:		3.5	3.6	3.7	3.8	3.9
Method:		OLS	OLS	OLS	OLS	OLS
Dependent Variable:		g_Sales	g_Sales	g_Sales	g_Sales	g_Sales
Volatility measure:		Vol_USD	Vol_HL	Vol_RER	Vol_INFL	Vol_SUB
Explanatory Variables						
Intercept		5.31 (31.89)	5.047 (30.94)	1.815 (19.66)	5.185 (32.10)	2.858 (19.26)
Sales at t0		-0.273 (-69.08)	-0.274 (-69.28)	-0.236 (-55.03)	-0.270 (-68.85)	-0.271 (67.68)
Competition	=1	0.034 (0.83)	0.036 (0.88)	0.013 (0.28)	0.060 (1.46)	0.043 (1.03)
	>1	0.078 (2.38)	0.078 (2.38)	0.075 (2.03)	0.079 (2.44)	0.090 (2.70)
	>5	0.043 (1.36)	0.043 (1.36)	0.057 (1.58)	0.037 (1.18)	0.054 (1.68)
Vol_	DOM	-0.123 (-8.02)	-0.22 (-5.22)	0.009 (11.14)	-0.103 (-24.73)	0.026 (1.74)
	FOR	-0.118 (-6.45)	-0.16 (-2.82)	0.014 (11.13)	-0.098 (-13.02)	0.005 (0.15)
Age		-0.004 (-4.93)	-0.004 (-4.97)	-0.004 (-4.91)	-0.003 (-4.52)	-0.004 (-5.16)
Age^2		0.000 (4.89)	0.000 (4.92)	0.000 (4.64)	0.000 (4.72)	0.000 (5.08)
Export		0.233 (13.59)	0.230 (13.42)	0.203 (11.24)	0.231 (13.53)	0.229 (13.32)
Foreign		0.245 (7.92)	0.240 (10.17)	0.231 (10.29)	0.232 (8.40)	0.256 (10.52)
Control Variables						
Size	S	0.110 (1.72)	0.103 (1.61)	0.107 (-1.35)	0.118 (1.86)	0.098 (1.50)
	M	0.582 (9.03)	0.578 (8.95)	0.293 (3.66)	0.581 (9.05)	0.559 (8.41)
	L	1.095 (16.48)	1.092 (16.41)	0.740 (9.07)	1.076 (16.27)	0.256 (10.52)
Year		Yes***	Yes***	Yes***	Yes***	Yes ***
Country		Yes**	Yes**	Yes**	Yes**	Yes**
Number of observations		21,729	21,729	16,470	21,572	21,183
R^2		0.22	0.21	0.20	0.24	0.21

5. Policy implications

Over the past four decades the world has witnessed a steady improvement in the policy environment facing foreign direct investors in developing countries. This shift in policy has been driven among other by an increasing amount of empirical evidence documenting the beneficial effects of FDI at all levels from demonstration effects, over narrative case study evidence to focused reports by international organisations, important contributed and independently authored book volumes on the topic and academic journal papers.

At the same time has the shift in policy in large part been one of the major drivers of the globalisation process in the form of international direct capital flows. In this context the recent financial crisis in developing countries and the global financial crisis have made policy-makers yet again re-consider the virtue of more interventionist policies including the need to restore capital controls and other measures of control towards FDI.

In the perspective of the present research hypothesis and results the study would cast in doubt the beneficial effects of restoring controlling measures on FDI and moving away from what has been achieved with open door policies over the past decades.

Policy-makers should be more concerned with the roots of instability and the impact that uncertainty has on the investment behaviour of their own firms. Placing new controls on FDI will not help to reduce this problem as there is no evidence showing that FDI is a source of instability in its own right, in fact the reverse is much more likely to be the case.

In the present study I have focused on ordinary investment data in the absence of separate series for R&D investment. Future studies could demonstrate and further document differences in adjustment cost related with different types of investment which may very well be the root towards understanding the differential investment behaviour of different types of owners in developing countries.

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APPENDIX

Table A1: Descriptive Statistics – Firm Specific Variables

	AGE	COMPETITION	G_LABOR	EXPORTER	FOREIGN	INVEST	LINVRATE	LEVERAGE	MAJORITY	LQ	ROA	G_SALES	SIZE	STATE
Mean	17.64866	3.465560	0.455027	0.212135	0.121920	0.632555	0.137537	0.877890	75.24567	2.437773	514.5791	0.157662	1.626022	0.043292
Median	12.00000	4.000000	0.037037	0.000000	0.000000	1.000000	0.000000	0.000000	90.00000	2.252554	0.347910	0.049002	2.000000	0.000000
Maximum	310.0000	4.000000	7199.000	1.000000	1.000000	1.000000	11.45578	199.0000	100.0000	18.43301	5062023.	20.69548	3.000000	1.000000
Minimum	-1.000000	1.000000	-1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-9.961167	-4035.880	-17.14190	0.000000	0.000000
Std. Dev.	16.87924	0.787362	23.26481	0.408822	0.327195	0.482112	0.523860	3.030140	27.86482	2.268903	36339.39	1.040808	0.890604	0.203513
Skewness	2.668682	-1.554727	282.0392	1.408270	2.311046	-0.549898	8.484206	18.62139	-0.624291	1.105037	118.7596	2.418730	0.104640	4.488257
Kurtosis	14.95148	4.975291	85910.90	2.983225	6.340935	1.302388	94.16992	690.7720	2.013418	7.001498	15668.31	34.43749	2.141147	21.14445
Jarque-Bera	909352.2	20407.74	3.29E+13	42481.19	172660.7	14279.97	16715304	1.12E+09	9451.917	18591.71	2.53E+11	2330152.	3781.907	2170876.
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	2248192.	125079.0	48741.10	27263.00	15533.00	52986.00	6415.825	49599.91	6740582.	52053.76	12727600	8714.916	188869.0	5504.000
Sum Sq. Dev.	36293091	22374.19	57976692	21479.55	13639.21	19469.42	12801.32	518750.4	69554212	109918.4	3.27E+13	59878.33	92129.78	5265.723
Observations	127386	36092	107117	128517	127403	83765	46648	56499	89581	21353	24734	55276	116154	127138

Table A2: Descriptive Statistics – Volatility Measures – Country and Year Specific Variables

	VOL_HL	VOL_INFL	VOL_RER	VOL_SUB	VOL_USD
Mean	0.259843	3.481201	3.291591	0.305606	2.414331
Median	0.000000	2.045000	1.800000	0.290975	2.000000
Maximum	1.000000	67.81000	156.8000	0.908915	40.36000
Minimum	0.000000	0.120000	0.460000	0.000000	0.000000
Std. Dev.	0.439414	7.040944	13.53813	0.206285	3.301870
Skewness	1.095239	7.681887	11.16967	0.422089	6.960905
Kurtosis	2.199549	69.28299	127.1534	2.464809	73.00060
Jarque-Bera	57.56187	39350.58	87522.11	10.36530	53910.44
Probability	0.000000	0.000000	0.000000	0.005613	0.000000
Sum	66.00000	710.1650	434.4900	76.09583	613.2400
Sum Sq. Dev.	48.85039	10063.70	24009.79	10.55330	2758.294
Observations	254	204	132	249	254

Table A3: Pearson correlation coefficients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.AGE	1.00	-0.02	-0.01	0.26	0.07	0.02	-0.05	0.00	-0.14	-0.00	-0.00	-0.05	0.31	0.11	0.04	-0.15	0.03	0.02	0.07
2.COMPETITION	-0.02	1.00	0.01	-0.09	-0.08	0.05	-0.03	-0.01	-0.02	-0.02	-0.01	-0.02	-0.04	-0.01	-0.04	0.03	0.03	-0.03	-0.04
3.G_LABOR	-0.01	0.01	1.00	0.02	0.01	0.02	0.02	-0.01	0.01	0.00	-0.00	0.03	0.02	-0.02	-0.00	-0.02	0.03	-0.00	0.01
4.EXPORTER	0.26	-0.09	0.02	1.00	0.24	-0.02	-0.05	0.08	-0.11	0.08	-0.01	-0.01	0.42	0.08	0.08	-0.13	0.04	-0.00	0.09
5.FOREIGN	0.07	-0.08	0.01	0.24	1.00	0.02	0.01	-0.01	0.01	0.08	0.00	-0.02	0.25	0.01	0.04	0.00	-0.01	0.06	0.03
6.INVEST	0.02	0.05	0.02	-0.02	0.02	1.00	0.07	0.02	-0.01	0.02	0.00	0.03	-0.01	0.02	-0.04	0.03	0.04	-0.01	-0.06
7.Log I/K	-0.05	-0.03	0.02	-0.05	0.01	0.07	1.00	-0.01	0.03	0.47	0.33	0.02	0.04	0.03	0.09	0.08	-0.01	0.03	0.04
8.LEVERAGE	0.00	-0.01	-0.01	0.08	-0.01	0.02	-0.01	1.00	-0.04	0.02	-0.01	0.02	0.09	-0.00	0.02	-0.07	0.03	-0.01	0.04
9.MAJORITY	-0.14	-0.02	0.01	-0.11	0.01	-0.01	0.03	-0.04	1.00	-0.02	-0.02	-0.02	-0.17	-0.05	-0.06	0.06	-0.03	-0.02	-0.08
10.Log Q	-0.00	-0.02	0.00	0.08	0.08	0.02	0.47	0.02	-0.02	1.00	0.18	0.15	0.18	0.02	0.09	-0.01	-0.00	0.03	0.06
11.ROA	-0.00	-0.01	-0.00	-0.01	0.00	0.00	0.33	-0.01	-0.02	0.18	1.00	0.00	0.01	-0.00	-0.00	0.01	0.03	-0.00	-0.02
12.G_SALES	-0.05	-0.02	0.03	-0.01	-0.02	0.03	0.02	0.02	-0.02	0.15	0.00	1.00	-0.01	-0.02	-0.04	-0.04	0.04	0.04	-0.04
13.SIZE	0.31	-0.04	0.02	0.42	0.25	-0.01	0.04	0.09	-0.17	0.18	0.01	-0.01	1.00	0.13	0.11	-0.08	-0.01	0.04	0.12
14.STATE	0.11	-0.01	-0.02	0.08	0.01	0.02	0.03	-0.00	-0.05	0.02	-0.00	-0.02	0.13	1.00	-0.06	0.10	-0.04	0.08	-0.06
15.VOL_HL	0.04	-0.04	-0.00	0.08	0.04	-0.04	0.09	0.02	-0.06	0.09	-0.00	-0.04	0.11	-0.06	1.00	-0.11	-0.08	0.18	0.90
16.VOL_INFL	-0.15	0.03	-0.02	-0.13	0.00	0.03	0.08	-0.07	0.06	-0.01	0.01	-0.04	-0.08	0.10	-0.11	1.00	-0.14	0.21	-0.21
17.VOL_SUB	0.03	0.03	0.03	0.04	-0.01	0.04	-0.01	0.03	-0.03	-0.00	0.03	0.04	-0.01	-0.04	-0.08	-0.14	1.00	0.00	-0.05
18.VOL_RER	0.02	-0.03	-0.00	-0.00	0.06	-0.01	0.03	-0.01	-0.02	0.03	-0.00	0.04	0.04	0.08	0.18	0.21	0.00	1.00	0.16
19.VOL_USD	0.07	-0.04	0.01	0.09	0.03	-0.06	0.04	0.04	-0.08	0.06	-0.02	-0.04	0.12	-0.06	0.90	-0.21	-0.05	0.16	1.00