Employment Growth in The Face of Exchange Rate Volatility: Role of FDI & Technology

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Abstract

Foreign equity finance (FDI) has been shown to mitigate the adverse impact of exchange rate volatility on growth in developing countries. Given the significance of technology intensive sectors in generating knowledge spillovers and promoting growth, this paper looks at the differential impact of exchange rate uncertainty across high and low technology sectors and analyses the role of FDI in mitigating the adverse effect of exchange rate volatility in sectors with high technology intensity. Real exchange rate volatility is found to have a negative impact on firm level growth. Further, this effect is found to be more significant for firms in technology intensive sectors compared to the rest. High level of fixed costs offers one possible explanation for the greater sensitivity of technology intensive firms to exchange rate uncertainty. FDI reduces the negative impact of exchange rate uncertainty on technology intensive sectors but the same cannot be said about access to domestic equity finance.

JEL Classification: F1, F4

Keywords: Real Exchange Rate Volatility, Trade Exposure, Employment

I. Introduction

International economics has long been concerned with the effects of exchange rate volatility on the real economy. In this context the ability of foreign equity finance to mitigate the adverse consequences of exchange rate uncertainty has been emphasized by recent studies such as Demir (2013). However, these studies do not explore the role of technology intensity in the transmission of exchange rate shocks. This paper uses a well-documented dataset on Indian firms to study the impact of exchange rate volatility on firm level employment growth across high and low technology intensity sectors with a focus on the role of FDI. Results indicate that exchange rate volatility has a negative impact on firm level employment growth and this effect is both economically and statistically significant. Firms in technologically intensive sectors are particularly vulnerable to exchange rate volatility on account of higher fixed cost. Foreign equity ownership helps in mitigating this adverse impact of exchange rate volatility on employment growth in technology intensive sectors. These results have important significance for the policy makers in developing economies trying to use FDI as a means of promoting growth and job creation.

Key contributions of this paper are threefold: a.) Using firm level information to capture the role of firm heterogeneity in determining their response to exchange rate volatility. b.) Highlighting the differential impact of exchange rate uncertainty on sectors with varying technology intensity[1]. c.) Examining the impact of access to foreign and domestic equity finance on firm's response to exchange rate volatility.

India presents an interesting case for examining the role of exchange rate volatility both because of its dynamic growth experience over the last two decades and also because of its unique approach to financial integration in the face of rapid globalization and trade openness. India's overall management of capital flows can be characterized by its calibrated and gradualist approach towards capital account liberalization. In line with that, the RBI has followed a managed floating exchange rate regime to balance the competing objectives of exchange rate stability, low inflation and domestic growth. Studies examining the impact of exchange rate volatility on Indian firms are, however, very few. In that respect this paper fills an important gap in the existing literature by looking at the impact of exchange rate volatility on firm level employment growth in India.

The paper is organized as follows: section 2 gives a brief review of literature while section 3 presents a small theoretical model to motivate the empirical analysis. Section 4 describes the dataset and methodology used in the empirical analysis and section 5 presents the results. Section 6 concludes.

II. Literature Review:

Macro and microeconomic effects of exchange rate volatility have long been a major concern in economics. Exchange rate volatility can affect growth through multiple channels and in theory; the sign of this relationship is ambiguous and depends on the underlying assumptions (Aiginger, 1987; Caballero and Pindyck, 1996; Dixit and Pindyck, 1994; the collection of articles in Aizenman and Pinto, 2005). In contrast, a rich body of empirical research points at an unambiguously negative effect of uncertainty on investment, employment, and growth (Aghion et al., 2009; Aizenman and Marion, 1999; Chong and Gradstein, 2009; Federer, 1993; Pindyck and Solimano, 1993; Rosenberg, 2004; Serven, 2003).

Studies show that exchange rate volatility works its effects through: a) changing the relative costs of production (Burgess and Knetter, 1998; Gourinchas, 1999; Klein et al., 2003); b) reducing the degree of credit availability from the banking system (Bernanke and Gertler, 1990) with contractionary effects on employment (Nickell and

[1] To our knowledge, no existing study in the literature has looked at this particular aspect in detail.

Nicolitsas, 1999; Sharpe, 1994) and investment (Fazzari et al., 1988); c) decreasing aggregate output and productivity growth especially in countries where financial development is low (Aghion et al., 2009; Ramey and Ramey, 1995); d) increasing inflation uncertainty, which is found to reduce employment (Seyfried and Ewing, 2001), and growth (Grier and Grier, 2006); e) raising interest rates (UNCTAD, 2006) with negative growth effects (Nickell and Nicolitsas, 1999); f) damaging firm balance sheets and net worth (Bernanke and Gertler, 1990; Braun and Larrain, 2005); and g) discouraging international trade by raising transaction risk (Baum and Caglayan, 2010).

That said, the idea that minimizing exchange rate volatility is an essential part of the growth recipe is disputed. The evidence linking exchange rate volatility to exports, employment and investment is less than definitive. Implications of volatility for financial stability and growth will depend on the presence or absence of the relevant hedging markets—and on the depth and development of the financial sector generally (Aghion et.al, 2009). There is some evidence that these markets develop faster when the currency is allowed to fluctuate and that banks and firms are more likely to take precautions, hedging themselves against volatility, than when the authorities seek to minimize volatility (e.g. Shah and Patnaik (2010)). There is evidence, for example, of faster development of these markets and instruments following the Asian crisis (see Hohensee and Lee (2004)). More generally, Duttagupta, Fernandez and Karasadag (2004) show that countries with more variable exchange rates tend to have more liquid foreign exchange markets, since their banks and firms have an incentive to participate.

To be sure, there are limits to the argument that price variability is conducive to the development of hedging markets and instruments: high levels of volatility will be subversive to financial development, including even the development of hedging markets and instruments, insofar as it induces capital flight and leads the authorities to resort to policies of financial repression.

Illustrating the ambiguity in the empirical evidence further, some studies of currency crises conclude that these cause only temporary and transient disruptions to growth (See e.g. Calvo, Izquierdo and Talvi (2006)). Ghosh et al. (1997) found no relationship between observed exchange rate variability and economic growth for a sample of 136 countries over the period 1960–89, Bailliu et al. (2001) reported a positive association between the degree of exchange rate flexibility and economic growth.

Dollar (1992) does report evidence of a negative OLS relationship between real exchange rate variability and growth in a sample of 95 developing countries covering the period 1976–85. Using different measures and country samples, Bosworth et al. (1995) and Hausmann et al. (1995) report similar results. Belke and Kaas (2004) find the same thing focusing on employment growth in the Central and Eastern European transition economies for a subsequent period. But two other studies exploring the relationship between real exchange rate variability and growth in different developing country samples (Ghura and Grennes 1993 and Bleaney and Greenaway 2001) find little evidence of a relationship. Potential explanations include different country samples, different periods, different controls, different ways of measuring the real exchange rate, and different degrees of omitted-variables and simultaneity bias.

Recent studies have tried to use firm level data to untangle the relationship between growth and exchange rate volatility. However, these studies are few and far between and, barring a few exceptions (e.g. Demir, 2009, 2013), focus on publicly listed firms from developed countries. Further, no existing study, to the best of our knowledge, looks at the differential impact of exchange rate uncertainty across sectors with different technology intensity. A careful analysis of the relationship between exchange rate volatility and growth taking in to account firm heterogeneity, industry structure and role of financial access is therefore much called for.

III.Theoretical Model

In this section we present a simple model of labor market to motivate our empirical analysis. Following Campa and Goldberg (1999; 2001) and Nucci and Pizzolo (2001; 2010), we consider the optimality conditions for profit maximization of a firm operating in an imperfectly competitive market. The firm's profit maximization problem is defined as:

$$\max_{q,q^*,z,z^*,l} \pi(q,q^*,z,z^*,l,e) = E\left[p_{i,t} \times q_{i,t} + p^*_{i,t} \times q^*_{i,t} \times e_t - z_{i,t} \times s_{i,t} - z^*_{i,t} \times s^*_{i,t} \times e_t - w_{i,t} \times l_{i,t}\right] \quad (1)$$

Subject to the technology constraint: $q_{i,t} + q^*_{i,t} = F\left(z_{i,t}, z^*_{i,t}, l_{i,t}\right)$ (2)

where q and q^* are the volumes of production for the domestic and the foreign markets, respectively, and the inverse demand functions $p(q,e)$ and $p^*(q^*,e)$, have been substituted into the profit function; l is the number of workers employed and z and z^* are the levels of domestic and imported non-labor inputs, respectively; w is the wage and s and s^* are the prices of the domestically produced and the imported inputs, respectively; e is the exchange rate, quoted as the number of domestic currency units per foreign currency unit (i.e., an increase of e denotes a currency depreciation).

The first order conditions with respect to q and q^* for the solution of the constrained maximization problem (1) are:

$$\frac{\partial p_{i,t}}{\partial q_{i,t}} \times q_{i,t} + p_{i,t} = \lambda_{i,t} \quad (3)$$

$$\frac{\partial p^*_{i,t}}{\partial q^*_{i,t}} \times q^*_{i,t} \times e_t + p^*_{i,t} \times e_t = \lambda_{i,t} \quad (4)$$

where λ is the Lagrange multiplier. Similarly, the first order conditions for profit maximization with respect to z, z^* and l are:

$$-s_{i,t} + \lambda_{i,t} \times \frac{\partial F\left(z_{i,t}, z^*_{i,t}, l_{i,t}\right)}{\partial z_{i,t}} = 0 \quad (5)$$

$$-s^*_{i,t} \times e_t + \lambda_{i,t} \times \frac{\partial F\left(z_{i,t}, z^*_{i,t}, l_{i,t}\right)}{\partial z^*_{i,t}} = 0 \quad (6)$$

$$-w_{i,t} + \lambda_{i,t} \times \frac{\partial F\left(z_{i,t}, z^*_{i,t}, l_{i,t}\right)}{\partial l_{i,t}} = 0 \quad (7)$$

Assuming a constant return to scale production technology, the Euler's theorem can be used to express total output as follows:

$$q_{i,t}+q_{i,t}^{*}=\frac{\partial F\left(z_{i,t},z_{i,t}^{*},l_{i,t}\right)}{\partial l_{i,t}}\times l_{i,t}+\frac{\partial F\left(z_{i,t},z_{i,t}^{*},l_{i,t}\right)}{\partial z_{i,t}}\times z_{i,t}+\frac{\partial F\left(z_{i,t},z_{i,t}^{*},l_{i,t}\right)}{\partial z_{i,t}^{*}}\times z_{i,t}^{*} \qquad (8)$$

Using the first order conditions (3-7) along with the Euler equation (8) and defining $\frac{1}{\mu}=\left(1+\frac{1}{\eta}\right)$ and $\frac{1}{\mu^{*}}=\left(1+\frac{1}{\eta^{*}}\right)$ as the reciprocals of the mark-up ratios set, respectively, in the domestic and foreign product markets, we get the following equilibrium equation:

$$w_{i,t}\times l_{i,t}=E\left[\frac{p_{i,t}\times q_{i,t}}{\mu_{i,t}}-z_{i,t}\times s_{i,t}+\frac{p_{i,t}^{*}\times q_{i,t}^{*}\times e_{t}}{\mu_{i,t}^{*}}-z_{i,t}^{*}\times s_{i,t}^{*}\times e_{t}\right] \qquad (9)$$

Taking log of both sides we get:

$$\ln\left(l_{i,t}\right)=\ln\left(E\left[\frac{p_{i,t}\times q_{i,t}}{\mu_{i,t}}-z_{i,t}\times s_{i,t}+\frac{p_{i,t}^{*}\times q_{i,t}^{*}\times e_{t}}{\mu_{i,t}^{*}}-z_{i,t}^{*}\times s_{i,t}^{*}\times e_{t}\right]\right)-\ln(w_{i,t}) \qquad (10)$$

Equation 10 gives us the demand curve for labor.

Assume a standard supply curve for labor given by:

$$\ln\left(l_{i,t}\right)=a_{0}+a_{1}\times\ln\left(w_{i,t}\right)+a_{2}\times\ln\left(y_{i,t}\right) \qquad (11)$$

where $\ln(y)$ is a measure of aggregate demand.

Using equation 11 to substitute for $\ln(w)$ in equation 10 we can get the following equation for equilibrium amount of labor:

$$\ln\left(l_{i,t}\right)=b_{0}+b_{1}\times\ln\left(\frac{p_{i,t}\times q_{i,t}}{\mu_{i,t}}-z_{i,t}\times s_{i,t}+E\left[\frac{p_{i,t}^{*}\times q_{i,t}^{*}\times e_{t}}{\mu_{i,t}^{*}}-z_{i,t}^{*}\times s_{i,t}^{*}\times e_{t}\mid\Omega_{t-1}\right]\right)+b_{2}\times\ln\left(y_{i,t}\right) \qquad (12)$$

To keep the model analytically tractable, assume that the only source of uncertainty is the exchange rate. Further, assume that the exchange rate follows a log-normal distribution with mean ν and variance σ_{t}^{2}, both of which are in the information set Ω_{t-1}. We can rewrite expression (12) as

$$\ln\left(l_{i,t}\right)=b_{0}+b_{1}\times\ln\left(\frac{p_{i,t}\times q_{i,t}}{\mu_{i,t}}-z_{i,t}\times s_{i,t}+\left(\frac{p_{i,t}^{*}\times q_{i,t}^{*}}{\mu_{i,t}^{*}}-z_{i,t}^{*}\times s_{i,t}^{*}\right)\times\exp\left(\nu+\frac{\sigma_{t}^{2}}{2}\right)\right)+b_{2}\times\ln\left(y_{i,t}\right) \qquad (13)$$

Assume: $\mu_{i,t} = \mu_{i,t}^{\ *} = \dfrac{p_{i,t} \times q_{i,t} + e_t \times p_{i,t}^{*} \times q_{i,t}^{*}}{z_{i,t} \times s_{i,t} + e_t \times z_{i,t}^{*} \times s_{i,t}^{*} + w_t \times l_t}$

Define**:** $R_{i,t}^{d} = p_{i,t} \times q_{i,t}, R_{i,t}^{f} = e_t \times p_{i,t}^{*} \times q_{i,t}^{*}, Cost_{i,t}^{d} = z_{i,t} \times s_{i,t}, Cost_{i,t}^{f} = e_t \times z_{i,t}^{*} \times s_{i,t}^{*},$
$Cost_{i,t} = Cost_{i,t}^{d} + Cost_{i,t}^{f} + w_{i,t} \times l_{i,t}$

Let: $\ln(A) = \ln\left(\dfrac{p_{i,t} \times q_{i,t}}{\mu_{i,t}} - z_{i,t} \times s_{i,t} + \left(\dfrac{p_{i,t}^{*} \times q_{i,t}^{*}}{\mu_{i,t}^{*}} - z_{i,t}^{*} \times s_{i,t}^{*} \right) \times \exp\left(\nu + \dfrac{\sigma_t^2}{2} \right) \right)$

$$\ln(A) = \ln\left(\frac{R_{i,t}^{d}}{\left(\frac{R_{i,t}^{d} + R_{i,t}^{f}}{Cost_{i,t}} \right)} - Cost_{i,t}^{d} + \left(\frac{R_{i,t}^{f} / e_t}{\left(\frac{R_{i,t}^{d} + R_{i,t}^{f}}{Cost_{i,t}} \right)} - Cost_{i,t}^{f} / e_t \right) \times \exp\left(\nu + \frac{\sigma_t^2}{2} \right) \right)$$

$$\ln(A) = \ln\left(Cost_{i,t} \times \frac{R_{i,t}^{d}}{\left(R_{i,t}^{d} + R_{i,t}^{f} \right)} - Cost_{i,t}^{d} + \left(Cost_{i,t} \times \frac{R_{i,t}^{f}}{\left(R_{i,t}^{d} + R_{i,t}^{f} \right)} - Cost_{i,t}^{f} \right) \times \exp\left(\nu + \frac{\sigma_t^2}{2} \right) \times \frac{1}{e_t} \right)$$

$$\ln(A) = \ln\left(Cost_{i,t} \times \left(\frac{R_{i,t}^{d}}{\left(R_{i,t}^{d} + R_{i,t}^{f} \right)} - \frac{Cost_{i,t}^{d}}{Cost_{i,t}} \right) + \times \frac{Cost_{i,t}}{e_t} \left(\left(\frac{R_{i,t}^{f}}{\left(R_{i,t}^{d} + R_{i,t}^{f} \right)} - \frac{Cost_{i,t}^{f}}{Cost_{i,t}} \right) \times \exp\left(\nu + \frac{\sigma_t^2}{2} \right) \right) \right)$$

Define: $\dfrac{R_{i,t}^{d}}{\left(R_{i,t}^{d} + R_{i,t}^{f} \right)} - \dfrac{Cost_{i,t}^{d}}{Cost_{i,t}} = Exposure_{i,t}^{d} = \Lambda_{i,t}^{d}$ and $\dfrac{R_{i,t}^{f}}{\left(R_{i,t}^{d} + R_{i,t}^{f} \right)} - \dfrac{Cost_{i,t}^{f}}{Cost_{i,t}} = Exposure_{i,t}^{f} = \Lambda_{i,t}^{f}$

$$\ln(A) = \ln\left(\left(Cost_{i,t} \times \Lambda_{i,t}^{d} + \left(\Lambda_{i,t}^{f} \right) \times \exp\left(\nu + \frac{\sigma_t^2}{2} \right) \times \frac{Cost_{i,t}}{e_t} \right) \right)$$

Therefore:

$$\ln(l_{i,t}) = b_0 + b_1 \times \ln\left(\left(Cost_{i,t} \times \Lambda_{i,t}^{d} + \left(\Lambda_{i,t}^{f} \right) \times \exp\left(\nu + \frac{\sigma_t^2}{2} \right) \times \frac{Cost_{i,t}}{e_t} \right) \right) + b_2 \times \ln(y_{i,t})$$

Elasticity of employment with respect to exchange rate volatility is

$$\frac{\Delta l_{i,t}}{\Delta \sigma_t^2} \times \frac{\sigma_t^2}{l_{i,t}} = \frac{-b_1}{2} \times \Lambda_{i,t}^{f} \times \sigma_t^2 \times \left(\exp\left(\nu_t + \frac{\sigma_t^2}{2} \right) \times \frac{Cost_{i,t}}{e_t \times A} \right)$$

Using $A = w \times l_{i,t}$ and $Cost_{i,t} \times \exp\left(\nu_t + \frac{\overline{\sigma}_t^2}{2}\right) \approx E\left[e_t \times Cost_{i,t}\right]$ we can write

$$\frac{\Delta l_{i,t}}{\Delta \sigma_t^2} \times \frac{\sigma_t^2}{l_{i,t}} = \frac{-b_1}{2} \times \Lambda_{i,t}^f \times \sigma_t^2 \times \left(E\left\{ \frac{Cost_{i,t}}{w \times l_{i,t}} \right\} \right)$$

We therefore propose the following econometric model for our econometric analysis:

$$\begin{aligned} \Delta l_{i,t} &= \Psi_0 + \Psi_1 \times \Delta l_{i,t-1} + \Psi_2 \times \Delta\left(\Lambda_{i,t-1}^f \times \sigma_{t-1}^2\right) + \Psi_3 \times \Delta\left(\Lambda_{i,t-1}^f \times S_{t-1}\right) \\ &+ \Psi_4 \times \Delta x_{i,t-1} + \Psi_5 Z_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{14}$$

The dependent variable in our model is the log difference in firm level employment $\Delta l_{i,t}$. Interaction between firm level trade exposure $\Lambda_{i,t}^f$ and exchange rate volatility is used to identify the effect of exchange rate uncertainty on firm level employment growth. Another interaction term between trade exposure and log-difference in monthly real exchange rate is added to capture the effect of exchange rate appreciation on employment level. Further, a lag of the dependent variable is added in the empirical model to capture the sluggishness in firm level employment adjustment.

$x_{i,t-1}$ is the vector of firm level control variables that includes log difference of – the total cost of production, share of labor in the total cost of production, firm size measured as their net fixed assets and total sales. $Z_{i,t}$ is the vector of time and industry specific dummies that capture exogenous time variant and industry specific shocks.

With lagged dependent variable in the equation, standard estimators are rendered inconsistent due to correlation between unobserved panel level effects and the lag of the dependent variable. We therefore use the two- step system GMM estimator suggested by Arellano and Bover (1995) and fully developed by Blundell and Bond (1998)[2i] to estimate equation 14.

IV.Data

The firm level dataset consists of information on 700 manufacturing firms regarding the number of workers employed, sales, total assets, exports and imports. The data is obtained from the CMIE - PROWESS database and cover fifteen year period from 2000 to 2014. The data covers eighteen manufacturing industries classified according to the two digit NIC code[3].

The trend employment growth amongst the firms in our sample was about 2.3 percent during the entire period while trend growth in sales was 8.7 percent. Average size of asset holdings of the firms in our sample was INR 9100 million while average workforce was 2300 during this period.

The share of foreign equity participation in our sample ranges from zero to 97 % of firm capital, with a standard deviation of 20%, and an average of 10.6%. Furthermore, around 16% of firms in the sample have foreign equity participation. Eighty percent of the firms in our sample are publicly listed while the remaining 20 percent are

[2] The system GMM estimator is itself based on the difference GMM estimator suggested by Arellano and Bond (1991)
[3] Appendix gives the details of industrial classification

unlisted. Of the 700 firms in the sample roughly ten percent were non-exporters while four percent had no imported inputs during the period under consideration. Our sample contains information on both publicly traded and non-traded private firms apart from the information on foreign equity ownership. Hence, we can explore if exchange rate uncertainty affects firms differently depending on firms' access to domestic or foreign equity capital. The dataset also contains information about export earnings and use of imported inputs by individual firm. This allows us to measure firm level trade exposure which we then use to identify the effect of exchange rate volatility on firm level employment growth. Table 1 presents some descriptive statistics of our dataset.

One shortcoming of the dataset is that it only includes the surviving firms and does not provide information on firms that exit from the sample due to exchange rate uncertainty. This survivorship, however, would bias our estimations against observing any significant effects of exchange rate uncertainty as the sample includes only the most successful firms, which must have developed the means to survive such negative shocks.

Prior to estimating our models we apply a number of sample selection criteria. First, we include only private firms with no public sector ownership. Secondly, we only keep firms with at least five consecutive years of data. Finally, due to multiple sources of information, a few firms had discrepancies in their reported export earnings and total sales figures. We drop those firms from our sample. This leaves us with a total of 692 firms.

Calculating Real Exchange Rate Uncertainty

To carry out our analysis, we need a proxy that captures the volatility of the exchange rate series. In the literature, different methodologies are used to construct measures of exchange rate uncertainty, although there is still no consensus on which one is the most appropriate (**Clark et al., 2004**). Our benchmark measure of exchange rate uncertainty is based on the GARCH (1, 1) model applied to log of monthly real exchange rate (we use real instead of nominal exchange rate since theoretically profits are affected by both nominal exchange rates and prices of traded goods). We estimate the GARCH (1,1) process using monthly data on real exchange rates from 1994 to 2014 provided by the *BIS*. The last estimated conditional standard deviation of each period is used as approximation of the conditional volatility at the beginning of the next period. For example, the conditional volatility for the year 2000 is the estimated conditional standard deviation for December 1999 in the GARCH (1,1) model using data from January 1994 to December 2014. We refer to this measure as "ER Vol.1"

Table 2 presents broad trends in real exchange rate volatility in India over the sample period using five year non-overlapping averages of this GARCH based conditional volatility measure. Uncertainty in the real exchange rate increased during this period according to this measure. At the same time this period saw significant real appreciation of Indian rupee in response to growing capital inflows with the exception of the second period.

The period between 2005 and 2009 saw RBI intervention in the foreign exchange market to prevent rupee appreciation driven by growing capital inflows. This intervention was 'sterilized' (initially using GOI securities followed by the use of specially issued Market Stabilization Scheme Bonds). By the end of 2007, however, monetary sterilization of forex intervention had become highly costly and ineffective. With the onset of sub-prime crisis in the US and the resultant increase in capital flow volatility globally, RBI was forced to move towards greater exchange rate flexibility and abandon its efforts at stabilizing the rupee. Overall trends in Table 2 capture this move towards greater exchange rate flexibility in the face of increasingly volatile capital flows and growing costs of monetary sterilization.

To test the robustness of our key results we use two alternative measures of real exchange rate volatility. The first one (ER Vol.2) is based on the annual standard deviation of the first difference of the logarithm of the monthly real exchange rate. For each year, we use the average of this monthly standard deviation from the previous six years as a proxy for exchange rate uncertainty. For the second proxy (ER Vol.3) we estimate a GARCH (1, 1) process

separately for every year from 2000 to 2014 using monthly data on real exchange rates from the previous six years. As in Clark et al. (2004), we use the last estimated conditional standard deviation as the approximation of the conditional volatility at the beginning of the next period. For example, the conditional volatility for the year 2000 is the estimated conditional standard deviation for December 1999 in the GARCH (1, 1) model using data from January 1994 to December 1999. The resulting measure of exchange rate volatility reflects medium- to long-run volatility.

V. Results

Table 3 presents the results from the benchmark model laid out in equation (14). Exchange rate volatility is found to affect firm level employment growth negatively and significantly for all three measures of volatility. The coefficient is also economically significant. A one standard deviation increase in real exchange rate uncertainty (0.0025) at the average level of trade exposure (0.15) reduces firm level employment growth by 0.7[4] percentage points. Changes in the level of real exchange rate, on the other hand, do not affect firm level employment growth significantly (coefficient on the interaction term between trade exposure and lagged real exchange rate growth is positive but insignificant). Of the remaining variables total cost and share of labor in total cost are negatively and significantly associated with firm level employment growth.

We check the robustness of these results by introducing alternative firm level controls and removing the crises years (2007 & 2008) from our sample. Table 4 presents the results from this exercise. As we can see, exchange rate uncertainty is still negatively and significantly correlated with firm level employment growth in all the specifications[5]. We now turn to the role of domestic and foreign equity finance in mitigating the adverse impact of exchange rate uncertainty.

Foreign Equity and Exchange rate Volatility

Foreign equity ownership can alter the impact of real exchange rate uncertainty on firm level employment growth through various channels (see Demir, 2013). Foreign owned firms might be more resilient in face of exchange rate shocks due to better access to internal/external finance, higher productivity, better risk management etc. At the same time, higher exchange rate uncertainty might encourage foreign firms to move production to less volatility markets; thereby reducing their investment and employment growth. To examine the role of foreign equity ownership we divide our sample in to foreign and domestically owned firms and estimate eq. (14) separately for those[6]. Table 5 presents the results from this exercise.

As can be seen form Table 5, exchange rate uncertainty does not affect employment growth amongst foreign owned firms significantly though it does have a significant and negative effect on employment growth amongst the domestically owned firms. Thus, foreign equity ownership does seem to mitigate the adverse impact of exchange rate uncertainty on employment growth. Sign and significance of the remaining variables remain largely unchanged. Using alternative measures of exchange rate volatility gives us identical results (see column 8-13)[7]. Next we look at a similar role of access to domestic equity finance in the face of exchange rate uncertainty.

Access to domestic equity markets

[4] 0.7 = 18*0.0025*0.15*100

[5] These results hold true when we use alternative measures of exchange rate uncertainty.

[6] Foreign Owned firms are defined as those with more that 50 percent foreign equity ownership.

[7] The constant term Ψ_0 is negative and insignificant for both foreign and domestically owned firms indicating lack of any significant difference in the average employment growth between foreign and domestically owned firms.

Access to domestic equity markets can also have significant effect on firm level employment dynamics in response to exchange rate shocks. If the borrowing capacity of a firm is related to its current earnings and if wages cannot be adjusted as the exchange rate fluctuates, then in response to exchange rate fluctuations the firm's ability to borrow will be affected, thereby affecting its employment growth. This would imply a smaller impact of exchange rate uncertainty on the employment growth of firms with access to domestic equity markets. At the same time, firms relying on equity markets for finance might be subject to exchange rate driven changes in investor sentiments and therefore, employment, to a much greater degree. We test for these differences by splitting our sample between listed and unlisted firms[8]. Table 6 presents the results from this exercise. Exchange rate uncertainty has negative and significant impact on both publicly listed and unlisted firms indicating that access to domestic equity finance does not mitigate the negative impact of exchange rate uncertainty on firm level employment in the same way as foreign ownership does. This is in line with the findings in Demir (2013)

Level of Technology

Exchange rate uncertainty can affect industries with different level of technology intensity differently. Industries that are more technology intensive might be more productive, have higher profit margins & greater market power and therefore better able to handle movements in exchange rate. At the same time, they might be more exposed to exchange rate volatility due to higher fixed costs and inelastic demand for imported inputs. The latter would be especially true for developing countries like India. Given the significance of technology intensive sectors in generating knowledge and productivity spillovers, it is important to study the effect of exchange rate uncertainty on high and low technology intensity sectors separately. We explore this issue by using the classification of industries by their technology intensity presented in Lall (2000).

We divide the sample in to High Tech[9] (hereafter H.T.) and Low Tech[10] (or L.T.) sectors and estimate Eq. (14) separately for each of those. Table 7 presents the result from this exercise. Exchange rate uncertainty affects firms in H.T. industries negatively and significantly though the same cannot be said about the firms in the L.T. industries. Clearly, technology intensity plays a significant role in determining the sensitivity of employment growth to exchange rate uncertainty. Inelastic demand for imported inputs and high fixed costs are two possible reasons for this difference in the response of H.T. and L.T. industries to exchange rate uncertainty. We explore the latter explanation in the next few paragraphs.

Fixed Cost

Most advanced technologies require sophisticated technology infrastructure implying high fixed costs. Examples of these fixed costs include payment of rent, property taxes and depreciation. High level of fixed costs might also cause employment growth in H.T. industries to become more sensitive to exchange rate uncertainty. While we do not have firm level estimates of fixed costs in our data set, we use expenditure on "rent and lease" as the share of total sales as a proxy for firms' fixed cost. According to this measure, the average fixed cost is roughly 5.8 percent of the total sales for the firms in our sample while the median fixed cost is 0.31 percent. At the same time, firms in the H.T. industries have a level of fixed costs which is 3.6 to 14 percent higher than that in the L.T sectors.

To check whether high fixed costs increase the employment elasticity of firms to exchange rate uncertainty we divide our sample in to firms with high fixed cost (i.e. those with fixed cost above the median (>0.31%)) and low fixed cost (those with fixed cost below the median). We then estimate equation 14 for both high and low fixed costs firms. Table 8 presents the results from this exercise. Once again, employment growth in firms with high fixed cost

[8] Listed firms – Firms listed on the Bombay Stock Exchange or the National Stock Exchange
[9] High Tech sectors - MT1-MT3, HT1-HT2; Lall (2000).
[10] Low Tech sectors - RB1-RB2 & LT1-LT2; Lall (2000)

is significantly affected by exchange rate uncertainty but the same cannot be said about the firms with low fixed cost. These results point towards the significance of high fixed costs in explaining the differences in responsiveness of high tech and low tech firms to exchange rate uncertainty.

Finally we check if foreign ownership helps mitigate the adverse effect of exchange rate uncertainty in H.T. industries by dividing the sample in to foreign owned and domestically owned firms and estimating equation 14 only for the H.T industries. Table 9 presents the results from this exercise. Exchange rate volatility affects employment growth negatively and significantly in the case of domestic firms but not for foreign owned firms in the H.T. industries. Thus, foreign ownership appears to play a significant role in mitigating the adverse impact of exchange rate volatility on firm level employment growth in the case of H.T. industries. Given the importance of high tech industries on account of their larger spillover effects in terms of creating new skills and generic knowledge; these results assume particular significance.

VI. Conclusion

As emerging markets open up to international trade and capital flows, they are forced to contend with sharp movements in their domestic currency. Efforts to dampen these movements in exchange rate involve significant costs (both implicit and explicit) including a potential loss in monetary policy autonomy. This paper looks at the impact of an increase in the real exchange rate volatility on firm level employment growth. It uses firm level data on 700 Indian manufacturing firms and a benchmark model derived from the profit maximization problem of an imperfectly competitive firm to study the response of employment growth to higher exchange rate volatility.

The key findings of this paper are as follows: a. Real exchange rate volatility has a significant and negative impact on firm level employment growth; especially in high tech firms. b. High levels of fixed costs offer one potential explanation for the greater sensitivity of H.T. sectors to exchange rate uncertainty. c. Foreign equity ownership significantly mitigates the adverse impact of exchange rate uncertainty but the same cannot be said about access to domestic equity finance.

Foreign equity ownership is often promoted as a means of generating employment growth in emerging countries like India. These results indicate that the direct benefit of foreign equity inflows in terms of faster employment growth might not be significant but foreign ownership does mitigate the negative impact of exchange rate shocks on firm level employment growth, especially for H.T. industries with enormous potential for productivity and technology spillovers. As emerging markets like India try to generate employment opportunities for their growing workforce, foreign equity capital can potentially fill the gap between domestic savings and investment needs and bring in new technologies. At the same time, they can play a stabilizing role in the face of exogenous shocks to key macroeconomic variables such as the exchange rate.

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Appendix A: Industry Classification

Industry Name	NIC-2008 Code/s
Food and Beverages	**10+11**
Tobacco	**12**
Textiles	**13**
Readymade Garments	**14**
Leather and Leather Products	**15**
Paper and Paper Products	**17**
Chemicals	**20+21**
Plastic and Rubber Products	**22**
Non-metallic mineral products	**23**
Basic Metal	**24**
Fabricated Metal Product	**25**
Computer and Electronics	**26**
Electrical Machinery	**27**
Misc. Machinery	**28**
Automobiles	**29**
Other Transport Equipment	**30**
Furniture	**31**

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Median	Std. Dev.	Min	Max
No. of Workers						
Foreign	923	2980	1053	7047	39	73833
Domestic	8765	2403	770	7126	12	127688
Public	8460	2663	842	7688	12	127688
Non-public	1920	1554	742	3559	65	30184
Δ ln(Workers)						
Foreign	687	0.016	0.008	0.14	-0.74	0.63
Domestic	5196	0.002	0	0.28	-6.6	3.1
Public	4921	0.02	0.004	0.35	-6.6	7.8
Non-public	1014	-0.03	-0.017	0.36	-5.8	3.8
Sales (Million Rupees)						
Foreign	923	15037	6157	30068	77.9	232515
Domestic	8765	20876	2142	138861	6.4	2563036
Public	8460	23587	2771	146240	31	2563036
Non-public	1921	5919.6	1297	17547	0	137982
Δ ln(Sales)						
Foreign	923	0.10	0.10	0.20	-1.3	0.86
Domestic	8207	0.09	0.11	0.4	-5.7	5.8
Public	8110	0.02	0.11	0.79	-11.8	7.5
Non-public	1599	-0.07	0.08	0.89	-10	3.3
Exposure [f]						
Foreign	923	0.12	0.06	0.17	-0.00	0.99
Domestic	8285	0.15	0.04	0.23	-0.01	1.0
Public	8184	0.16	0.05	0.23	-0.01	0.99
Non-public	1651	0.09	0.00	0.16	-0.01	0.94
Assets (Million Rupees)						
Foreign	923	2735	904	6003	15.3	62979
Domestic	8365	6073	701	34282	9.3	709909
Public	8460	6556	902	35962	9.3	709909
Non-public	1920	2226	376	7638	14.8	62979

Table 2: Indian Experience of Real Exchange Rate Volatility

Period	REER Volatility	REER Change (log diff.)
2000-2004	0.013	0.04
2005-2009	0.016	0.00
2010-2014	0.017	0.03

Table 3: Exchange Rate Uncertainty and Employment Growth[11]

Dependent Variable: (Δl_t)	**(1)** **ER Vol. I**	**(2)** **ER Vol. 2**	**(3)** **ER Vol. 3**
Δl_{t-1}	-0.02 [0.0]	-0.02 [0.0]	-0.03 [0.0]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-17.3*** [6.6]	-18.0*** [6.3]	-18.4*** [6.2]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	0.04 [0.1]	0.11 [0.1]	0.0 [0.1]
$\Delta cost_{t-1}$	-0.04** [0.0]	-0.04** [0.0]	-0.04** [0.0]
$\Delta sales_{t-1}$	0.1 [0.0]	0.07 [0.0]	0.07 [0.0]
$\Delta labourshare_{t-1}$	-0.00** [0.0]	-0.00** [0.0]	-0.00** [0.0]
$\Delta size_{t-1}$	-0.01 [0.0]	-0.0 [0.0]	-0.0 [0.0]
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Observation	4161	4161	4161
No. of Firms	668	668	668
No. of Instruments	113	116	125
AR(1)	0.00	0.00	0.00
AR(2)	0.81	0.70	0.77
Hansen	0.32	0.47	0.42

[11] **Notes:** Two-step system GMM results using Windmeijer finite-sample correction. All growth rates are measured by logarithmic differences. (***), (**) and (*) refer to significance at 1%, 5% and 10% levels respectively. σ is real exchange rate volatility.

Table4[12] : Robustness Check[13]

Dependent Variable : Δl_t	Productivity (4)	Profitability (5)	Leverage (6)	No Crisis Years (7)
Δl_{t-1}	0.01 [0.0]	-0.03 [0.0]	-0.04 [0.0]	-0.1 [0.1]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-20.3** [10]	-17.0** [6.8]	-14.2** [7.2]	-18.3** [8.3]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	-0.13 [0.2]	0.03 [0.1]	0.07 [0.1]	0.23 [0.2]
$\Delta Cost_{t-1}$	-0.06 [0.0]	-0.04 [0.0]	-0.04 [0.0]	-0.07 [0.0]
$\Delta Sales_{t-1}$	0.11 [0.0]	0.07 [0.0]	0.07 [0.0]	0.15 [0.0]
$\Delta Labourshare_{t-1}$	-0.00 [0.0]	-0.00** [0.0]	-0.00 [0.0]	-0.00 [0.0]
$\Delta Size_{t-1}$	-0.04 [0.0]	-0.01 [0.0]	-0.02 [0.0]	0.00 [0.0]
$Productivity_{t-1}$	0.03*** [0.0]			
$Profitability_{t-1}$		0.00 [0.0]		
$Leverage_{t-1}$			-0.01 [0.0]	
Time Dummies	YES	YES	YES	
Industry dummies	YES	YES	YES	YES
Observation	2514	4125	3730	1654
No. of Firms	433	660	635	560
No. of Instruments	114	114	115	66
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.56	0.82	0.70	0.80
Hansen	0.34	0.28	0.14	0.16

[13] **Notes:** Two-step system GMM results using Windmeijer finite-sample correction. All growth rates are measured by logarithmic differences. (***), (**) and (*) refer to significance at 1%, 5% and 10% levels respectively. σ is real exchange rate volatility.

Table 5: Exchange Rate and Foreign Ownership - GMM Estimates[14]

Dependent Variable : Employment Growth (Δl_t)	**Foreign < 50 [ER Vol. I] (8)**	**Foreign > 50 [ER Vol. I] (9)**	**Foreign <50 [ER Vol. II] (10)**	**Foreign >50 [ER Vol. II] (11)**	**Foreign < 50 [ER Vol. III] (12)**	**Foreign >50 [ER Vol. III] (13)**
Δl_{t-1}	-0.03 [0.0]	0.03 [0.1]	-0.03 [0.0]	0.03 [0.1]	-0.04 [0.0]	0.03 [0.0]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-14.9** [7.6]	-13.9 [15]	-17.5** [7.1]	-4.7 [8.7]	-18.8*** [6.9]	-4.2 [9.1]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	0.03 [0.1]	0.21 [0.5]	0.1 [0.1]	0.35 [0.4]	0.0 [0.1]	0.32 [0.5]
$\Delta cost_{t-1}$	-0.04 [0.0]	0.01 [0.0]	-0.04 [0.0]	0.0 [0.0]	-0.04 [0.0]	0.0 [0.0]
$\Delta sales_{t-1}$	0.07 [0.0]	0.02 [0.1]	0.07 [0.1]	0.01 [0.1]	0.08 [0.0]	0.0 [0.0]
$\Delta labourshare_{t-1}$	-0.00 [0.0]	0.00 [0.0]	-0.00 [0.0]	0.00 [0.0]	-0.00 [0.0]	0.0 [0.0]
$\Delta size_{t-1}$	-0.02 [0.0]	-0.02 [0.0]	-0.02 [0.0]	-0.0 [0.0]	-0.00 [0.0]	-0.03 [0.0]
Year dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Observation	3640	521	3640	521	3640	521
No. of Firms	608	89	608	89	608	89
No. of Instruments	113	109	113	109	125	121
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.76	0.72	0.74	0.72	0.70	0.78
Hansen	0.32	0.79	0.30	0.81	0.30	0.98

[14] . (***), (**) and (*) refer to significance at 1%, 5% and 10% levels respectively

Table 6: Exchange Rate and Access to Domestic Equity - GMM Estimates[15]

Dependent Variable : Employment Growth (Δl_t)	**Listed Firms [ER Vol. I] (14)**	**Unlisted Firms [ER Vol. I] (15)**	**Listed Firms [ER Vol. II] (16)**	**Unlisted Firms [ER Vol. II] (17)**	**Listed Firms [ER Vol. III] (18)**	**Unlisted Firms [ER Vol. III] (19)**
Δl_{t-1}	-0.02 [0.0]	-0.41*** [0.1]	-0.02 [0.0]	-0.41*** [0.1]	-0.02 [0.0]	-0.38*** [0.1]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-15.9** [6.2]	-22.0** [10]	-15.9** [6.4]	-24.4** [12.1]	-17.9*** [6.6]	-24.9*** [6.9]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	0.01 [0.1]	-0.5 [0.5]	0.09 [0.1]	-0.55 [0.5]	0.02 [0.2]	-0.71 [0.5]
$\Delta cost_{t-1}$	-0.05 [0.0]	0.02 [0.0]	-0.05** [0.02]	0.02 [0.0]	-0.0 [0.0]	0.02 [0.0]
$\Delta sales_{t-1}$	0.09 [0.0]	0.07 [0.0]	0.09 [0.0]	0.07 [0.0]	0.09 [0.0]	0.07 [0.1]
$\Delta labourshare_{t-1}$	-0.00 [0.0]	0.00 [0.0]	-0.00 [0.0]	0.0 [0.0]	-0.0 [0.0]	0.00 [0.0]
$\Delta size_{t-1}$	-0.05 [0.0]	0.07 [0.1]	-0.04 [0.0]	0.08 [0.1]	-0.05 [0.0]	0.07 [0.1]
Year Dummy	YES	YES	YES	YES	YES	YES
Industry Dummy	YES	YES	YES	YES	YES	YES
Observation	3499	532	3499	532	3499	546
No. of Firms	547	118	547	108	547	113
No. of Instruments	113	108	113	108	124	122
AR(1)	0.00	0.07	0.00	0.00	0.00	0.06
AR(2)	0.72	0.70	0.71	0.69	0.70	0.43
Hansen	0.44	0.28	0.42	0.24	0.43	0.61

[15] . (***), (**) and (*) refer to significance at 1%, 5% and 10% levels respectively

Table 7 Exchange rate volatility and technology intensity[16]

Dependent Variable : (Δl_t)	**ER Vol. I [High Tech] (20)**	**ER Vol. I [Low Tech] (21)**	**ER Vol. II [High Tech] (22)**	**ER Vol. I [Low Tech] (23)**	**ER Vol. III [High Tech] (24)**	**ER Vol. III [Low Tech] (25)**
Δl_{t-1}	-0.01 [0.0]	-0.1 [0.0]	-0.02 [0.1]	-0.1 [0.0]	-0.02 [0.1]	-0.1 [0.0]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-29.2** [11.3]	-0.27 [3.7]	-26.2** [11.4]	-0.59 [3.9]	-27.6** [11.9]	-0.3 [4.1]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	-0.03 [0.2]	0.22 [0.2]	0.06 [0.2]	0.35 [0.2]	-0.05 [0.0]	0.34 [0.2]
$\Delta cost_{t-1}$	-0.02 [0.0]	-0.06 [0.0]	-0.02 [0.0]	-0.04 [0.0]	-0.0 [0.0]	-0.04 [0.0]
$\Delta sales_{t-1}$	0.07 [0.0]	0.14 [0.1]	0.06 [0.0]	0.12 [0.1]	0.06 [0.0]	0.12 [0.1]
$\Delta labourshare_{t-1}$	-0.00 [0.0]	-0.00** [0.0]	-0.00 [0.0]	-0.00 [0.0]	-0.00 [0.0]	-0.00 [0.0]
$\Delta size_{t-1}$	-0.06 [0.0]	0.1 [0.1]	-0.06 [0.0]	0.1 [0.1]	-0.06 [0.0]	0.1 [0.1]
Time Dummies	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES	YES
Observation	2447	1714	2447	1714	2447	1714
No. of Firms	388	280	338	280	338	280
No. of Instruments	117	122	116	122	116	122
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.63	0.81	0.62	0.82	0.62	0.82
Hansen	0.43	0.15	0.40	0.28	0.38	0.29

[16] **Notes:** Two-step system GMM results using Windmeijer finite-sample correction. All growth rates are measured by logarithmic differences. (***), (**) and (*) refer to significance at 1%, 5% and 10% levels respectively. σ is real exchange rate volatility.

Table 8: Fixed Cost[17]

Dependent Variable : Employment Growth (Δl_t)	**High Fixed Cost [ER Vol. I] (26)**	**Low Fixed Cost [ER Vol. I] (27)**	**High Fixed Cost [ER Vol. II] (28)**	**Low Fixed Cost [ER Vol. II] (29)**	**High Fixed Cost [ER Vol. III] (30)**	**Low Fixed Cost [ER Vol. III] (31)**
Δl_{t-1}	-0.09 [0.0]	0.00 [0.0]	-0.08 [0.0]	-0.00 [0.0]	-0.08 [0.0]	-0.00 [0.0]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-19.5** [8.3]	-4.3 [6.1]	-20.1** [8.9]	-6.8 [7.1]	-21.5** [9]	-7.2 [7.0]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	0.13 [0.2]	0.02 [0.2]	0.20 [0.2]	0.04 [0.3]	0.10 [0.2]	0.00 [0.2]
$\Delta cost_{t-1}$	-0.04 [0.0]	-0.00 [0.0]	-0.05 [0.0]	-0.00 [0.0]	-0.05 [0.0]	-0.00 [0.0]
$\Delta sales_{t-1}$	0.09 [0.1]	0.00 [0.0]	0.1 [0.0]	0.00 [0.0]	0.10 [0.1]	0.00 [0.0]
$\Delta labourshare_{t-1}$	-0.00 [0.0]	-0.00 [0.0]	-0.00 [0.0]	-0.00 [0.0]	-0.00 [0.0]	-0.00 [0.0]
$\Delta size_{t-1}$	0.03 [0.0]	0.06 [0.0]	0.02 [0.0]	-0.05 [0.0]	0.02 [0.0]	-0.05 [0.0]
Time Dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Observation	2062	2099	2062	2099	2062	2099
No. of Firms	335	333	335	333	335	333
No. of Instruments	123	121	126	124	126	124
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.26	0.20	0.30	0.20	0.30	0.21
Hansen	0.54	0.17	0.48	0.13	0.51	0.13

[17] **Notes:** Two-step system GMM results using Windmeijer finite-sample correction. All growth rates are measured by logarithmic differences. (***), (**) and (*) refer to significance at 1%, 5% and 10% levels respectively. σ is real exchange rate volatility.

Table 9: Foreign Equity Ownership and Technology Intensive Sectors

Dependent Variable : Employment Growth (Δl_t)	**Foreign < 50 [ER Vol. I] (34)**	**Foreign > 50 [ER Vol. I] (35)**	**Foreign < 50 [ER Vol. II] (36)**	**Foreign >50 [ER Vol. II] (37)**	**Foreign <50 [ER Vol. II] (38)**	**Foreign >50 [ER Vol. III] (39)**
Δl_{t-1}	-0.02 [0.1]	0.09 [0.1]	-0.03 [0.0]	0.12 [0.1]	-0.03 [0.1]	0.12 [0.1]
$\Delta(\Lambda_{i,t-1} * \sigma^2_{t-1})$	-26.5** [11.5]	-15.9 [32.3]	-25.3** [10.6]	-19.2 [24.6]	-26.8** [11.4]	-20.1 [26.6]
$\Delta(\Lambda_{i,t-1} * S_{t-1})$	-0.04 [0.3]	-0.06 [0.9]	0.00 [0.2]	0.2 [0.8]	-0.11 [0.3]	0.1 [0.9]
$\Delta cost_{t-1}$	-0.02 [0.0]	0.03 [0.0]	-0.01 [0.0]	0.03 [0.0]	-0.01 [0.0]	0.03 [0.0]
$\Delta sales_{t-1}$	0.06 [0.0]	-0.01 [0.1]	0.05 [0.0]	-0.01 [0.1]	0.05 [0.0]	-0.02 [0.1]
$\Delta labourshare_{t-1}$	-0.00 [0.0]	0.00 [0.0]	-0.00 [0.0]	0.00 [0.0]	-0.00 [0.0]	0.00 [0.0]
$\Delta size_{t-1}$	-0.07 [0.0]	-0.04 [0.0]	-0.07 [0.0]	-0.05 [0.0]	-0.07 [0.0]	-0.05 [0.0]
Time Dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Observation	2034	413	2034	413	2034	413
No. of Firms	344	65	344	65	344	65
No. of Instruments	116	115	116	115	116	115
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.59	0.79	0.60	0.50	0.59	0.63
Hansen	0.39	1.00	0.32	1.00	0.33	1.00

[i] Arellano and Bond/Blundell and Bond