

**Employment Growth under Exchange Rate Volatility:  
Does Access to Foreign or Domestic Equity Markets Matter?**

Firat Demir

Department of Economics, University of Oklahoma

Hester Hall, 729 Elm Avenue

Norman, Oklahoma, USA 73019

Tel: 405 325 5844, Fax: 405 325 5842

E-mail: [fdemir@ou.edu](mailto:fdemir@ou.edu)

**Abstract**

Employing a matched employer-employee dataset, this paper explores the effects of exchange rate uncertainty on the growth performances of domestic versus foreign, and publicly traded versus non-traded firms in a major developing country, Turkey. The empirical results using dynamic panel data estimation techniques and comprehensive robustness tests suggest that exchange rate uncertainty and currency crises have significant employment growth reducing effects. However, having access to foreign, and to a lesser degree, domestic equity markets is found to reduce these negative effects at significant levels. These empirical findings continue to hold after controlling for firm heterogeneity due to differences in size, export orientation, external indebtedness, industrial characteristics, and profitability and productivity rates.

Keywords: Growth; Foreign Ownership; Capital Structure; Exchange Rate Uncertainty

JEL Classification Codes: F23; F31; G15; G31; G32

## **1. Introduction**

The macro and microeconomic effects of exchange rate uncertainty and volatility have long been a major concern in international economics. The primary purpose of the Gold Standard of the 19<sup>th</sup> and early 20<sup>th</sup> centuries and the ensuing Bretton Woods system, as well as the Exchange Rate Mechanism under the European Monetary System of the 1990s was to ensure exchange rate stability. In fact, the Article 1 of Articles of Agreement of the International Monetary Fund (IMF) continues to single out the promotion of “exchange stability” as one of its primary objectives. Nevertheless, increasing financial liberalization and capital market integration after the collapse of the Bretton Woods system in 1973 exposed both developed and developing countries to large swings in exchange rates.

In a majority of empirical studies, increasing exchange rate uncertainty is found to have economically and statistically significant profitability, investment, growth, and to some degree, trade reducing effects (Pindyck and Solimano, 1993; Ramey and Ramey, 1995; Aizenman and Marion, 1999; Bleaney and Greenaway, 2001; Grier and Smallwood, 2007). Nevertheless, the research on the firm growth effects of exchange rate uncertainty has been much limited with an exclusive focus on publicly traded firms located mostly in developed countries despite substantial structural differences between developed and developing countries, and between publicly traded and non-traded firms. The lack of research on developing country experiences is especially surprising given that developing countries face higher levels of exchange rate uncertainty with stronger negative welfare effects than developed countries (Pallage and Robe, 2003). The exclusive focus on the publicly traded firms is also striking both because of the structural differences between publicly traded and non-traded firms, and also because of the low market capitalization rates in developing countries that limit the sample sizes considerably. There has also been no research exploring the differences between domestic and foreign firms in their growth responses to exchange rate uncertainty despite the fact that foreign direct investment (FDI) inflows to developing countries increased radically since the early 1990s reaching \$735 billion (or 43% of global flows) by 2008 from \$35 billion in 1990 (or 17% of global flows). The FDI inflows corresponded to 36% of total gross fixed capital formation of developing countries in 2007 that was nine times of their 1990

level of 4% (UNCTAD, 2010). The increasing participation of foreign firms in production and capital formation is expected to have major growth effects in developing countries given that they are more productive, profitable, and have easier access to global and domestic capital markets. As a result they may help mitigate the contractionary effects of exchange rate shocks and currency crises in developing countries. Yet, there has been little empirical work analyzing the growth effects of exchange rate uncertainty on foreign vis-à-vis domestic firms.

Building on the heterogeneous firm literature, the current study contributes to the existing research on the growth effects of exchange rate uncertainty under financial constraints by addressing four issues that were previously unaccounted for. First, it separates firms based on their degree of access to foreign equity. Second, it separates firms based on their access to the domestic stock market. Third, it focuses on a major developing country, Turkey. Fourth, instead of using country or industry level aggregates, it further separates firms based on their export orientation, external indebtedness, industrial characteristics, and productivity and profitability rates.

The Turkish case is interesting because it entails three important features. First, Turkey liberalized its capital account in 1989, much earlier than other developing countries, and adopted a very open foreign investment regime that translated into substantial FDI inflows.<sup>1</sup> Second, as an emerging economy, Turkey faced high levels of economic instability for the last two decades including significant exchange rate uncertainty and two severe currency crises in 1994 and 2001. Third, despite comprehensive liberalization programs and a substantial foreign bank presence, the financial sector in Turkey has remained highly underdeveloped. As a result, private firms face strict credit constraints and are forced to finance their investments mostly from internal sources or short-term borrowing, making them more exposed to exchange rate uncertainty.<sup>2</sup> Fourth, Turkey provides us with a unique firm level dataset, which

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<sup>1</sup> During 1990-2009, Turkey received over \$95 billion FDI inflows, whose share as a percentage of gross fixed capital formation increased from less than 2% in 1990 to 16% in 2007.

<sup>2</sup> The share of short-term debt in total debt of top 500 manufacturing firms was 71% during 1992-2007.

includes 585 private manufacturing firms with over 4,800 firm year observations, accounting for 28% of total manufacturing value added during 1993-2005. In addition to balance sheet and income statement information, the dataset includes time series information on the capital structure of firms such as the foreign ownership shares, and their access to the domestic equity market.

The empirical analysis using dynamic panel estimation techniques and comprehensive robustness tests suggest that exchange rate uncertainty has a significantly negative growth effect on private firms. However, having access to foreign capital is found to overcome this negative effect at economically and statistically significant levels. According to point estimates, a one standard deviation increase in exchange rate uncertainty reduces firm growth by around 4 percentage points among domestic firms. In contrast, firms with 10% (25%) or more foreign ownership enjoy a 3.5 (4.6) percentage point *increase* in their growth rates after an exchange rate shock. We also find that domestic firms with access to the stock market perform significantly better than other domestic firms under exchange rate shocks. We confirm these results during currency crises episodes as well. Moreover, we find that the negative growth effect of exchange rate uncertainty is significantly lower for export oriented domestic and foreign firms. The findings also show that, unlike domestic firms, foreign firms with higher levels of external indebtedness perform better than others under exchange rate shocks.

The paper is organized as follows: the next section provides a brief overview of the literature on uncertainty and growth relationship. The third section introduces the empirical analysis including the data, methodology and estimation issues. The fourth and fifth sections present the empirical results and robustness analysis, and the final section concludes the paper.

## **2. Literature review**

Exchange rate uncertainty can affect investment and growth through multiple channels though, theoretically speaking, the sign of the relationship is ambiguous depending on the underlying assumptions (Aiginger, 1987; Dixit and Pindyck, 1994; Caballero and Pindyck, 1996; and the collection of articles in Aizenman and Pinto, 2005). In contrast, a growing body of empirical research points out an unambiguously negative effect of uncertainty on investment, employment, and growth (Federer, 1993;

Pindyck and Solimano, 1993; Aizenman and Marion, 1999; Serven, 2003; Rosenberg, 2004; Aghion et al., 2009; Chong and Gradstein, 2009). Accordingly, exchange rate uncertainty works its effects through: a) changing the relative costs of production with both creative and destructive growth effects (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)<sup>3</sup> with contractionary effects on employment (Sharpe, 1994; Nickell and Nicolitsas, 1999), inventories (Kashyap et al. 1994), and investment (Fazzari et al., 1988); c) decreasing productivity growth especially in countries where financial development is low (Aghion et al., 2009), and reduce economic growth (Ramey and Ramey, 1995); d) increasing inflation uncertainty, which reduces 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) discourage international trade by raising transaction risk (Grier and Smallwood, 2007).

In view of the transmission channels outlined above, the growth effects of exchange rate uncertainty ultimately depend on firm and country characteristics. For example, in the presence of financing constraints firms that have access to domestic and/or foreign capital markets can deal with unexpected exchange rate shocks better than others. Similarly, the levels of export orientation, leverage, import dependence, size, productivity, and profitability also determine the nature of firm response to exchange rate shocks (Klein et al., 2003). Regarding country specific factors, Gupta et al. (2007) find that currency crises are more likely to have contractionary effects in emerging markets than in developed or other developing countries. In fact, exchange rate uncertainty is expected to have more depressing growth effects in developing countries because of the following vulnerabilities in these markets: a) Low levels of financial market deepening and the lack of hedging instruments; b) the presence of original sin and

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<sup>3</sup> Under credit shocks, high share of short term financing (as in developing countries) can also put substantial constraints on firms (Chang and Velasco, 2000). Besides, banking crises in emerging markets are often accompanied by currency crises (Beck et al., 2003).

dollarization with strong balance sheet effects; c) higher levels of openness, and the invoicing of exports in hard currencies; d) higher levels of exchange rate pass-through; and e) higher levels of exchange rate, capital flow, consumption, and growth volatility.

Nevertheless, despite the heterogeneity in firm and country specific factors, few studies addressed them in empirical research. First, there is limited research looking into the effects of firm access to foreign equity. In theory, exchange rate expectations affect the future cash flow and profit expectations of foreign firms and determine their entry and expansion decisions. According to option-pricing models, for example, increasing exchange rate uncertainty deters foreign firms' investment and growth as they postpone their entry or expansion decisions (Campa, 1993). Aizenman (2003) using a model of vertically integrated multinational firms argues that increasing macroeconomic volatility in emerging markets reduces foreign firms' employment as they switch production to less volatile markets. Conversely, increasing exchange rate uncertainty may increase foreign firms' entry and growth as risk-averse foreign firms substitute foreign production for exports (Cushman, 1985; Goldberg and Kolstad, 1995). Even under risk-neutrality, firms may choose to increase their foreign investments or to divert home investments to foreign locations due to increasing profitability of foreign plants (Sung and Lapan, 2000).<sup>4</sup> In addition, firms with access to foreign equity can deal with exchange rate shocks and market volatility more effectively thanks to their better access to international goods and capital markets, larger supply of internal finance through parent company, and better risk management, know-how and experience, and productivity (Mitton, 2006; Desai and Foley, 2007; Arnold and Javorcik, 2009; Yasar and Paul, 2009). Besides, workers employed by foreign multinationals are reported to have higher skills and productivity (Aitken et al., 1996; Navaretti et al. 2003; Almeida, 2007; Huttunen, 2007, Yasar and Paul, 2009). As a result, foreign firms may display lower short-run sensitivity to volatility by keeping worker turnover low

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<sup>4</sup> Russ (2007), however, argue that a multinational firm's response to exchange rate volatility depend on the nature of the exchange rate shock, that is whether it results from home or host country factors.

to prevent the spillover of their technology and know-how to local competitors through employer switching (Hamermesh, 1993; Fosturi et al., 2001).

Empirically speaking, Cushman (1985), using data on FDI flows from the U.S. to five industrialized countries, and Goldberg and Kolstad (1995), using the U.S. bilateral FDI flows with three industrialized countries, find that increasing exchange rate risk significantly increases FDI flows. Accordingly, multinationals substitute foreign capital for decreasing exports in response to increasing risk. Likewise, following the firesale literature and using firm level data, Aguiar and Gopinath (2005) find that foreign firms significantly increased their acquisitions in East Asia during 1996-1998. In contrast, Campa (1993) finds that exchange rate uncertainty significantly reduces foreign investment from 35 countries (more than 80% of entries were from seven developed countries) into the U.S. On the other hand, Gorg and Wakelin (2002) fail to find any statistically significant and economically robust effect of exchange rate volatility on either US outward or inward FDI to and from 12 developed countries.

The differences between publicly traded and non-traded firms are also neglected in the current literature with a disproportionate weight given to the publicly traded firms. In this literature, Mitton (2006) using static panel data techniques with 1141 publicly traded firms in 28 emerging markets (with the number of firms ranging between 2 and 136 per country) explores the effects of stock market liberalization on firm performance and finds that firms with access to foreign capital grow faster and enjoy higher investment and profitability rates. Similarly, using BEA data on US multinationals and Worldscope data on publicly traded emerging country firms, and employing a static panel data analysis, Desai et al. (2007) find that US multinationals grow faster in the aftermath of sharp depreciations. Chong and Gradstein (2009), however, is the only research we are aware of that looks into the effects of uncertainty on firm growth using a sample that includes publicly non-traded firms. Using the World Bank's World Business Environment survey with firm level cross section data from 80 countries, Chong and Gradstein (2009) find that economic policy uncertainty (as perceived by the respondent firms) significantly reduces firm growth.

### 3. Empirical analysis

#### 3.1 The methodology and benchmark specification

In order to explore whether domestic and foreign firms respond differently to exchange rate uncertainty, we begin our empirical analysis by adopting the following benchmark dynamic specification (see Hamermesh, 1993; Fabbri et al., 2003; Navaretti et al., 2003; Rosenberg, 2004; Desai et al., 2008):

$$Growth_{i,t} = \alpha_0 + \alpha_1 Growth_{i,t-1} + \alpha_2 RER_t + \alpha_3 Volatility_t + \alpha_4 Foreign_{i,t} + \alpha_5 Volatility_t * Foreign_{i,t} + \alpha_6 X_{i,j,t} + \varepsilon_{i,t}$$

where  $i=1, \dots, n$ ,  $j=1, \dots, k$ , and  $t=1993, \dots, 2005$  respectively refer to the firm, industry, and time series elements of the data, and  $\varepsilon_{it}$  is the error term. All firm and industry level variables are deflated using the domestic manufacturing sector price index. We employed the two-step system GMM dynamic panel data (DPD) estimator by Arellano and Bover (1995) and Blundell and Bond (1998), and used  $t-s$  (for  $2 \leq s \leq 3$ ) dated variables as instruments.<sup>5</sup> Using the system GMM method we aim to control for parameter endogeneity, state-dependence, and simultaneity bias. We computed robust two-step standard errors by the Windmeijer finite-sample correction method. The validity of the set of instruments is tested by the Hansen test of overidentifying restrictions while the presence of serial correlation is tested by a second order serial correlation test.

*Growth* is measured by the logarithmic growth rate of the number of workers of firm  $i$  at time  $t$ . Lagged  $l$  measures the persistency and adjustment speed of labor demand. A small coefficient suggests fast labor demand adjustment. We used employment growth to proxy firm growth given that a firm's production and expansion decisions are a function of both labor and capital, and the long term growth of a firm can be measured using either of these two variables. Since we lack data on physical capital, we chose employment growth as our main variable.

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<sup>5</sup> The DPD estimates are obtained using the `xtabond2` command in Stata 10.1 written by David Roodman. The stationarity of all variables are confirmed using the panel unit root tests of Im et al. (2003). Repeating the analysis using one-step estimation yielded similar results.



*RER* is the 12-month average logarithmic growth rate of effective real exchange rate (an increase is a real appreciation) to control for the level effects as opposed to volatility. Appreciating real exchange rate can reduce firm growth through decreasing export competitiveness, increasing import competition, or balance sheet effects (Gupta et al., 2007; Desai et al., 2008). Alternatively, a currency appreciation may increase firm growth thanks to falling cost of imported intermediate and capital goods, or lower wage demands because of lower expected domestic prices.

*Volatility* is the exchange rate volatility variable measured by the annual average conditional variance from a GARCH (1, 1) process. The empirical literature offers a number of competing approaches for the construction of volatility measure including the simple or moving standard deviation of the series. However, this proxy gives rise to substantial serial correlation in the summary measure. Furthermore, theoretically speaking, uncertainty is caused by unpredictable innovations to the variable of interest, while sample variation includes predictable innovations from past behavior as well.<sup>6</sup> Therefore, to be able to separate the predictable from the unpredictable exchange rate shocks and to capture the volatility clustering often found in exchange rate series; we adopted a GARCH model to generate the uncertainty measure. From here on, we will refer to uncertainty and volatility interchangeably.

Given that the firm data are annual, we constructed the uncertainty proxy incorporating monthly variations in exchange rate up to a year. We used monthly exchange rates instead of short term alternatives such as daily rates for measuring volatility assuming that daily fluctuations are less relevant for manufacturing firms' long term investment and employment decisions. Based on the discussion before, we expect a negative relationship between *Volatility* and *Growth*.

*Foreign* is a dummy variable that takes the value of one for firms with 10% (25%) or higher foreign ownership rate. We expect a negative relationship between foreign ownership and employment growth if, as suggested by previous studies, foreign firms are more capital intensive and more productive

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<sup>6</sup> For a discussion of different volatility and uncertainty measures, see Serven (1998) and Wolf (2005).

than domestic firms. However, if the majority of foreign firms are vertical FDI, and are located in Turkey for lower labor costs then we may find a positive relationship.

*Volatility\*Foreign* is an interaction variable capturing the effect of *Volatility* on foreign owned firms. Given better access to domestic and foreign capital markets, better risk and financial management and portfolio diversification, and better planning and organization, foreign firms are expected to be less vulnerable to exchange rate uncertainty. However, given the portfolio allocation decision they face in multiple countries, increasing uncertainty may also slow down foreign firm growth more.

*X* is a vector of standard firm and industry specific control variables including the following:

*Size* is the natural log of real total assets of firm *i* at time *t*. If increasing size leads to diseconomies of scale, the size-growth relationship can be negative. Also, since larger firms have higher sunk costs, firm size may be a proxy for the degree of investment irreversibility (Rosenberg, 2004). As a result, larger firms may be more sensitive to increasing uncertainty. Alternatively, scale and scope economies and entry barriers may favor large firms' growth over small ones. Besides, firms' access to external credit may be a positive function of their size and thereby affect their future growth. Gibrat's law, on the other hand, suggests that firms' growth is independent of its size.

*Sales* is the logarithmic growth rate of net annual sales of firm *i* at time *t*, and controls firm specific demand and supply shocks.<sup>7</sup>

*Industry* is the annual logarithmic growth rate of two-digit manufacturing industry real output controlling for industry-wide demand and supply shocks (a list of industries is in the appendix). Exchange rate volatility is expected to have smaller negative effects in those industries where firms have pricing power and less import dependent, and production is less labor intensive (Campa and Goldberg, 2001).

*Wages* is the annual logarithmic growth rate of real wages in two-digit manufacturing sector *j* at time *t*.<sup>8</sup>

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<sup>7</sup> Given the derived demand nature of employment, we used GMM type instruments for sales growth.

## 3.2 Extensions

### 3.2.1 Access to domestic capital market

We expect exchange rate shocks to have different growth effects on firms with access to the domestic equity market. The existing theoretical research suggests that publicly traded firms enjoy easier access to external finance, have better governance and risk management, and are more productive and profitable than non-traded firms. However, they may also be more exposed to market fluctuations and face higher shareholder pressure, which increase their sensitivity to uncertainty. To test whether publicly traded firms perform differently than others, we included the following variables to our baseline equation (1):

*Stock Market* is a dummy variable taking the value of one if firm  $i$  is publicly traded in year  $t$ .

We expect publicly traded firms to have higher growth in capital accumulation, but not necessarily in employment if they are also more efficient, productive, or capital intensive in production.

*Volatility\*Stock Market* is an interaction variable of *Volatility* and *Stock Market*. Having better access to capital markets is expected to reduce the negative effect of exchange rate shocks. However, given the higher responsiveness of firms' valuation to market fluctuations, publicly traded firms may be harder hit by such shocks.

*Foreign\*Stock Market* is an interaction variable of *Foreign* and *Stock Market* controlling for publicly traded foreign firms.

*Volatility\*Foreign\*Stock Market* is an interaction variable controlling for any differential effect of volatility on foreign firms whose shares are traded in the stock market. If publicly traded foreign firms are more sensitive to rising volatility, we may find a negative relationship.

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<sup>8</sup> Here we instrumented *Wages* with the one-period lagged values to control for any contemporaneous effect of exchange rate uncertainty on employment through higher wages, and also for the reverse causality from labor demand (Andersen and Sorensen, 1988).

### 3.2.2 Export structure

Exporting firms are generally found to be more productive and capital intensive, larger, faster growing, more competitive and have better access to international markets than non-exporting firms (Bernard and Jensen, 1999). Some explanations for these differences include the scale effects as market size expands, learning by exporting that may increase factor productivity, higher competition due to output tradability, or that there is a self-selection process where more efficient firms tend to export more (Tybout, 2003). Comparing firms in our dataset, the average output share of exports is not significantly different between domestic and foreign firms and averages 27% and 28%, respectively. At the same time we observe an increasing share of foreign firms in total exports (reflecting their increasing market share), reaching 47% in 2005 from 29% in 1993. We expand the initial specification by including the following variables:

*Exports* that is the natural log of one plus the percentage share of exports in total output of firm  $i$  at time  $t-1$ . Due to the endogeneity problem between export performance, and exchange rate fluctuations, we used one-period lagged values.

*Volatility\*Exports* that is an interaction variable between *Volatility* and *Exports*. Assuming that firms involved in foreign trade have better knowledge and access to foreign financial markets, they may utilize hedging instruments that are not available to domestic firms. Also, exporting firms may be able to shield themselves better from domestic goods market disturbances caused by volatility. Yet, given the lack of local hedging instruments and the fact that manufactured good exporting developing countries are price takers in international markets with the transactions being invoiced in few hard currencies, exporting firms may be more exposed to exchange rate volatility.

*Exports\*Foreign* is an interaction term controlling for differences within and between export oriented domestic and foreign firms.

*Volatility\*Exports\*Foreign* is an interaction term controlling for differences between export oriented domestic and foreign firms in their growth responses to exchange rate shocks. The structure of foreign firms (i.e. vertical or horizontal) is expected to affect their reaction to uncertainty. Vertically integrated foreign firms, for example, may choose to reduce their growth in markets with higher exchange

rate risk and relocate to lower risk countries. Horizontally integrated firms, on the other hand, may or may not be as much affected depending on whether they are targeting the host or neighboring country markets.

*RER\*Exports* controls for the exchange rate level effects on export oriented firms. Depending on demand and supply elasticities as well as imported input dependence, firms with higher export shares are expected to grow faster after currency depreciations.

*RER\*Exports\*Foreign* is an interaction term controlling for the exchange rate level effects on export oriented foreign firms.

### 3.2.3 Leverage

Next, we differentiated firms based on their level of external indebtedness. Increasing financial leverage (i.e. debt to total assets ratio) reflects firms' access to external finance and therefore can have a positive effect on growth. Yet, increasing indebtedness may also make new borrowing more difficult and can slow down growth (Lang et al., 1996). Among the sample firms, the leverage ratio of foreign firms at 10% (25%) threshold levels is 59% (57%) as opposed to 63% (64%) for domestic firms. We introduce the following variables to our baseline regression:

*Leverage* is the natural log of leverage ratio of firm  $i$  at time  $t-1$ . The lagged value of *Leverage* is used to avoid any endogeneity or reverse causality problem.

*Volatility\*Leverage* is an interaction term of *Volatility* and *Leverage*. Exchange rate volatility can affect firms differently depending on the level of their external indebtedness: First, firms that are exposed to currency mismatch problem will suffer from fluctuations in the domestic currency value of external liabilities. Second, firms with maturity mismatch problem will suffer from fluctuations in short term interest rates as the monetary authority intervenes to curtail excess volatility, or as the risk premium on external borrowing increases. And third, as the risk premium increases, rising cost of external borrowing will hurt those firms with higher leverage ratios and external finance dependence more through decreasing supply and increasing cost of external finance (Braun and Larrain, 2005).

*Leverage\*Foreign* is an interaction term controlling for growth differences within and between domestic and foreign firms based on their external indebtedness.

*Volatility\*Leverage\*Foreign* controls for the effect of *Volatility* on foreign firms at different levels of external indebtedness. Foreign firms in emerging markets are found to have lower leverage ratios than domestic firms (Mitton, 2006). Besides, exchange rate shocks may have different effects on domestic versus foreign firms even at the same leverage levels given the former's better risk management, and possibly smaller share of short term debt.

*RER\*Leverage* and *RER\*Leverage\*Foreign* control for the effects of fluctuations in exchange rate *levels* on domestic and foreign firms at different levels of external indebtedness.

### **3.3 The data**

The firm-level panel dataset is compiled from the annual surveys of the Istanbul Chamber of Industry on the largest 500 private manufacturing firms in Turkey, and is unbalanced. The second largest 500 manufacturing firm surveys and the Istanbul Stock Exchange (ISE) database are also utilized to complete some of the missing observations. Given that the foreign ownership share data in the surveys are available only after 1993, we limited our analysis to the 1993-2005 period, during which Turkey received more than 90% of its post-1980 total FDI inflows. The panel, apart from being one of the most comprehensive firm level datasets from developing countries, also has the advantage that unlike the surveys from statistical institutes, it is a matched employer/employee dataset with the names of the firms included. Furthermore, given the topic at hand, the dataset provides us with the firm level percentage share of foreign ownership in total equity for each year. Considering that other firm level data sources classify foreign firms only based on a benchmark level and is time-invariant, this is a considerable advantage. Last, but not the least, unlike most other datasets (such as Amadeus or Worldscope), our sample firms, both domestic and foreign, are not limited with only those that are publicly traded. This advantage allows us to directly explore any differential growth effects of domestic and foreign capital market access under exchange rate shocks.

One shortcoming of the dataset, however, is that it includes only surviving firms. It is possible that exiting firms might have had stronger reactions to exchange rate uncertainty than the survivors. This would bias our results against finding any significant effect of uncertainty on firm growth, and as such

finding a significant effect among the survivors will strengthen our results. To limit this bias we expanded our initial sample using the second largest 500 manufacturing firm dataset as well as the Istanbul Stock Exchange data on publicly traded firms.

In the empirical specification, we classified a firm foreign owned if the share of foreign equity is more than 10% (25%).<sup>9</sup> The annual number of firms ranges from 292 for domestic firms and 75 for foreign firms in 1993 to 399 and 124 in 1999, respectively (Table 1). All data were checked for errors and obviously misrecorded observations were discarded. In the regression analysis, we excluded those firms with only one year of data, and those extreme outlier observations whose absolute value of logarithmic change of employment and sales exceeded 1.00. This resulted in a marginal reduction in sample size corresponding to less than 1.5% of total observations. After this restriction, we had 585 firms in 21 manufacturing sectors (based on two-digit ISIC codes) with 4831 observations. On average, both domestic and foreign firms in the sample jointly account for 28% of total manufacturing value added in GDP and 50% of total manufactured goods exports of Turkey during 1993-2005.

**<Insert Table 1 and 2 Here>**

Foreign firms (at 10% ownership) account for a minimum of 20% and a maximum of 26% of the sample with an average of 23% (Table 1). They are responsible for 25% of employment, and 36% of sales and exports in the sample (Table 2). Based on both average and median size of total assets and sales, foreign firms are larger than domestic firms. Likewise, foreign firms appear to be significantly more profitable and productive, with profitability rates reaching twice as high as the domestic firm medians. The average profitability among foreign firms at 10% (25%) threshold is 11.5% (12.5%) as opposed to 6.7% (6.6%) among domestic firms (Table 2). Moreover, the median (mean) leverage ratio is 60.2% (63.4%) for domestic firms and 57.4% (58.9%) for foreign firms. Looking at the export orientation,

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<sup>9</sup> We also experimented with alternative threshold levels such as 50%, 75%, and a continuous variable. On average 87% and 62% of firms with at least 10% foreign ownership has at least 25% and 50% foreign shares, respectively. Among firms with at least 25% foreign shares, 72% have at least 50% foreign share.

however, we do not observe any significant differences. The median (mean) export share in sales is 21% (27%) for domestic firms and 19.5% (27.8%) for foreign firms.

Looking at the median growth performances, we see that firms with 10% (25%) foreign ownership have higher sales but slightly lower employment growth rates (Table 1). Also, the cross-sectional variance of employment growth is significantly higher for domestic firms. In terms of structural changes, while we find that the median output share of exports steadily increased for both domestic and foreign firms, we also observe a decline in the median (mean) firm profitability from around 10% (21%) for domestic and 13% (25%) for foreign firms in 1993 to 3% (3%) and 8% (12%), respectively in 2005.

**<Insert Table 3 and 4 Here>**

Publicly traded firms, on the other hand, account for a minimum of 22% and a maximum of 31% of the sample with an average of 27%. Overall, 27% of domestic and 25% of foreign firms are publicly traded and they account for 29% and 37% of employment, and 35% and 39% of total sales of domestic and foreign firms, respectively (Table 3). Publicly traded domestic firms account for 22%, 23% and 19% of total employment, sales, and exports, respectively. Likewise, publicly traded foreign firms are responsible for 9%, 14%, and 14% of total employment, sales, and exports (Table 4). Both average and median size (i.e. employment, assets and sales) of publicly traded domestic and foreign firms are bigger than non-traded firms. Yet, they have lower employment and sales growth. Overall, publicly traded firms also have higher profitability and productivity rates than their respective counterparts (Table 4).

#### **4. Results**

The results from columns (1) and (4) of Table 5 suggest that exchange rate uncertainty has an economically and statistically significant negative effect on domestically owned firms. According to point estimates, a one standard deviation (0.0016) increase in uncertainty (the impact factor) reduces employment growth of domestic firms by 4.2 - 4.4 percentage points. In contrast, access to foreign capital by 10% (25%) or more of the equity is found to reverse this negative effect at significant levels: the impact of one-standard deviation increase in exchange rate uncertainty becomes positive for these firms with the point estimates of 3.5 and 4.7 percentage points at 10% and 25% foreign ownership rates,



respectively. The positive effect is also found to be increasing in the rate of foreign ownership. Similarly, results in columns (2) and (5) suggest that firms with access to domestic capital markets grow significantly faster than others under exchange rate shocks. Comparing publicly traded and non-traded domestic firms, we find that the impact factors drop from -4.8 and -5.1 to -2.5 percentage points once a firm has access to the stock market. Likewise, the impact factors for foreign firms that have access to domestic equity market increase to 4.5 and 5.9 percentage points from 2.2 and 3.2. As such, the results provide support to the argument that access to foreign and domestic capital markets significantly reduces the negative effects of exchange rate shocks, though significantly more so for the former.

**<Insert Table 5 Here>**

Nevertheless, it is possible that the superior performance of publicly traded firms is driven by the publicly traded foreign firms. At any given year less than 26% (22) of publicly traded firms at 10% (25%) threshold are foreign with an average of 22% (18%) for the time period analyzed. Unlike previous studies, which focused only on publicly traded foreign firms, we can also explore the differences between the reactions of publicly traded and non-traded foreign firms to exchange rate uncertainty. In columns (3) and (6) we report the results after including an interaction term separating publicly traded foreign firms. In this case, the domestic firms with capital market access continue to perform significantly better than others with impact factors increasing from -5.3 and -5.9 to -1.3. In contrast, however, it appears that exchange rate shocks hurt publicly traded foreign firms more than non-traded ones. In particular, we find that the impact factors drop from 3.2 and 4.7 percentage points to 0.5 and 0.3, respectively. Yet, publicly traded foreign firms continue to outperform publicly traded and non-traded domestic firms. The higher sensitivity of publicly traded foreign firms to uncertainty may result from their ‘home bias.’ Lack of familiarity with and knowledge of local market conditions can make foreign shareholders and parent company management more risk averse, and cause higher sensitivity to market volatility. Lack of transparency, and incompatible accounting standards and legal protections may also make stock market listed foreign firms more sensitive to exchange rate risk in developing countries (Ammer et al., 2006). As a robustness check, we repeated the regressions with a higher foreign ownership threshold level of

50% and found even stronger results confirming the higher sensitivity of publicly traded foreign firms to uncertainty than non- traded ones.

Looking at the performance of foreign and publicly traded firms, we find that they display lower employment growth than others (measured at the mean uncertainty level) possibly reflecting higher efficiency and capital intensity of these firms. Other control variables, including firm size, 2-digit manufacturing industry output growth, and 2-digit manufacturing industry wage growth are found with the expected signs yet at statistically insignificant levels. Output growth is found to be a robust and significant firm level variable in explaining employment growth. We also find that the labor demand adjustment is quite fast with annual employment changes accounting for 95% of the desired adjustment.

#### **4.1 Export orientation**

In Table 6 we differentiated firms based on their export orientation, and continued to find a significantly positive volatility-response reducing effect of foreign firm ownership. The positive effect of the interaction variable (*Volatility\*Foreign*) is found to be increasing with the foreign equity share. We also found that export oriented firms are less vulnerable to volatility suggesting better exchange risk management. Comparing firms at the 10<sup>th</sup> and 90<sup>th</sup> percentile of the distribution based on export shares (that are 0% and 68%)<sup>10</sup>, we find that the negative impact factor significantly decreases as export share increases for both domestic and foreign firms.

**<Insert Table 6 Here>**

However, depending on the type of foreign firms, that is vertical or horizontal, export oriented domestic and foreign firms may differ in their reactions to volatility. In columns 2 and 4 we introduced additional interaction variables to differentiate domestic and foreign firms based on export orientation. We find that while the previous results continue to hold regarding the significantly positive effect of

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<sup>10</sup> The impact factors are based on the 10<sup>th</sup> and 90<sup>th</sup> percentile (1+log) levels of *Exports* corresponding to 0 and 0.52.

volatility and foreign ownership interaction, the impact factor becomes negative for foreign firms.<sup>11</sup> Furthermore, we find that export oriented foreign firms are significantly more sensitive to exchange rate uncertainty than export oriented domestic firms. Indeed, the export oriented domestic firms not only significantly do better under exchange rate uncertainty but also the impact factors turn positive. This may result from the structure of foreign firms in Turkey. For vertically integrated foreign firms, increasing exchange rate uncertainty can slow down growth more than domestic firms given the international supply chain decisions involved. Yet, even in the case of horizontally integrated firms that seek market access, the results may still hold true. Indeed, given the relatively higher labor costs in Turkey compared to other emerging markets, and that a majority of foreign firms in our sample are export oriented (with an average of 28% export share), it is possible that horizontal FDI firms choose Turkey as a hub center for accessing neighboring country markets in Eastern Europe, the Middle East and Central Asia. This may increase their sensitivity to uncertainty more than domestic export oriented firms.

Looking at its direct effect, we find that firms with higher export orientation display lower employment growth, possibly reflecting increasing productivity, capitalization or competitive pressures.

#### **4.2 External finance indebtedness**

Next, we separated firms based on their level of external indebtedness. In columns (1) and (3) of Table 7, while we find that firms with higher financial leverage grow significantly faster (by around 3.3 percentage points) they are also more vulnerable to exchange rate shocks. According to point estimates, the impact factor for domestic firms is -5.8 at the 90<sup>th</sup> percentile level of indebtedness (89%) as opposed to -1.2 at the 10<sup>th</sup> percentile level (29%).<sup>12</sup> For foreign firms, the impact factor falls from 6 at the 10<sup>th</sup> percentile to 1.4 at the 90<sup>th</sup> percentile level. However, it is possible that domestic and foreign firms at the same level of

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<sup>11</sup> The percentage of foreign firms at 10% threshold level with 0% export orientation steadily decreased from 24% in 1993 to 8% in 2005 with an overall average of 14% during the full period.

<sup>12</sup> The impact factors are based on the 10<sup>th</sup> and 90<sup>th</sup> percentile (log) levels of *Leverage* corresponding to -1.245 and -1.112.

external indebtedness may react differently to increasing uncertainty. We checked for this possibility by introducing additional interaction variables in columns (4) and (8). We find that while the qualitative results for domestic firms continue to hold, foreign firms are found to differ from others significantly. In particular, the point estimates suggest that higher leveraged foreign firms do significantly better than other foreign and domestic firms with impact factors reaching 3.4 and 6.7 at the 90<sup>th</sup> percentile leverage level with 10% and 25% foreign ownership rates as opposed to -3.1 and -4.2 at the 10<sup>th</sup> percentile level, respectively. Moreover, the positive effect of leverage for foreign firms is found to be increasing in the level of foreign equity share.

**<Insert Table 7 Here>**

## **5. Robustness analysis**

### **5.1 Profitability, productivity and access to capital markets**

Given the higher (mean and median) profitability rates of foreign firms and publicly traded firms (Table 2 and 4), in Table 8 we check whether it is firm level differences in profitability and productivity, rather than capital market access (or export orientation, and indebtedness) that matter for growth. We expect both foreign ownership, and access to domestic capital markets to affect firm profitability and productivity. Previous studies show that foreign firms and stock market listed firms are more profitable and productive. We introduced the profitability and productivity rates in a lagged form to avoid reverse causality, and the contemporaneous effect of exchange rate shocks. The profitability rate is defined as net profits before taxes divided by the end of last period total assets. We excluded outliers by dropping those observations where the absolute value of profitability rate exceeded one. Similarly, the productivity rate is defined as output per worker and we excluded outliers below and above the 1<sup>st</sup> and 99<sup>th</sup> percentiles.

**<Insert Table 8 Here>**

As expected, we find that more profitable and productive firms grow faster than others. Regarding our key variables of interest, the results confirm our previous findings showing a significantly negative effect of exchange rate uncertainty, and a significantly positive interaction effect of access to foreign equity (which is again found to be increasing in the level of foreign participation). After

controlling for profitability and productivity differences in columns (1) and (3), and (5) and (7), we find that the impact factors for domestic firms are in the range of negative 3.4 - 3.5, and negative 3.6 - 3.8 while those for foreign firms are in the range of positive 3.0 - 3.7, and 4.3 - 5.3. Once we differentiate publicly traded firms in columns (2) and (4), and (6) and (8), we find that publicly traded domestic firms perform significantly better under exchange rate shocks than non-traded ones. In contrast, publicly traded foreign firms perform significantly worse in the face of higher uncertainty than non-traded foreign firms.

## **5.2 Firm growth during currency crises**

In this section we compare the growth differences of foreign and domestic firms during currency crises. Turkey had two serious currency cum banking crises in 1994 and 2001 that led to a 39% devaluation on April 6, 1994, and a 40% devaluation on February 23, 2001. In both cases, the currency crisis was accompanied by a banking crisis leading to three and eighteen bank failures (whose deposit market shares were 7% and 22%), respectively. We can use these two episodes for a natural experiment in comparing firm growth in the face of an extreme exchange rate and credit market shock (the cost of borrowing reached four-digit numbers in the aftermath of each of these crises). Thus, we modify our equation (1) and introduce a crisis dummy taking the value of one for 1994 and 2001. To isolate the crisis effects, we dropped the exchange rate uncertainty and the rate of depreciation variables and instead introduced a time dummy for each year except the crises periods.

**<Insert Table 9 Here>**

The regression results in Table 9 suggest that foreign firms perform significantly better than domestic firms during financial crises. According to the point estimates in columns (1) and (3), the negative impact of financial crises is 2-3 times smaller for foreign firms than domestic ones. On the other hand, in columns (2) and (4) while we continue to find that firms with stock market access perform better than others the effect is not statistically significant. The foreign ownership effect, however, continues to be significantly positive, both economically and statistically.

### 5.3 Additional sensitivity tests

One possible bias affecting our findings may be the 10% (25%) threshold level of foreign ownership that we used. As argued by Mansfield and Romeo (1980) transfer of technology may be greater in fully owned foreign firms facilitating higher productivity or better work force restructuring. The (unreported) results with 50% and 75% ownership threshold levels were not significantly different than those reported. Next, we employed the following robustness checks: a) First, we excluded those sectors that had no foreign firms, which were (number of firms in parenthesis) ISIC2 19, 30, and 35. b) Second, to test whether our results are driven by the excess exchange rate volatility in 1994 and 2001 that mark the dates of financial-cum-currency crises with excessive exchange rate volatility, we repeated our benchmark regressions after excluding these years. The (unreported) results after these checks confirm our findings.

Finally, we included two additional control variables: a) *Import Dependence*, which is a sectoral import dependence variable measured by the 2-digit total intermediate goods import dependence ratio for 1998 from the OECDs' 2006 Input-Output tables. Appreciating exchange rate will lower the cost of imported intermediate and final capital goods as well as the final consumption goods (increasing import competition and rising substitution of foreign for domestic production). As such, increasing exchange rate uncertainty may negatively affect firm growth in sectors that have higher import dependence for its inputs. Thus we added three additional control variables to all regression equations estimated: i) *Import Dependence*, ii)  $RER * Import\ Dependence$ , and iii)  $Volatility * Import\ Dependence$ . b) *Tax*, which is the natural log of total tax wedge between total labor costs to the employer and the corresponding net take-home pay for single workers without children at average earnings levels (average percentage rate). It is a proxy variable for labor market rigidities. c) A proxy for the cost of domestic capital using the ratio of manufacturing price index to GDP deflator. The (unreported) regression results were similar to those reported and none of the additional controls were statistically significant at conventional levels.

### 6. Conclusion

The findings of this study extend the existing research on the growth effects of exchange rate shocks and currency crises in developing countries. The empirical findings suggest that exchange rate uncertainty has

economically and statistically significant negative effects on firm growth. However, having access to foreign or domestic equity markets is found to reduce these negative effects at significant levels. We also found some evidence that the positive effect of foreign ownership is increasing in the rate of foreign equity participation. Comparatively speaking, the results suggest that firms with access to foreign equity outperform domestic firms, with or without access to domestic capital markets. These empirical results continue to hold after controlling for other sources of firm heterogeneity such as differences in size, export orientation, external indebtedness, industrial characteristics, and profitability and productivity rates. Better portfolio and risk management, and superior ability to access internal and external financing sources appear to contribute significantly to the higher growth performance of foreign firms. Those local firms with the least capital market access, higher external indebtedness, and lower export shares experience the largest growth contraction under exchange rate shocks. The empirical findings highlight the importance of having access to foreign, and to a lesser degree, domestic capital markets in stabilizing growth and reducing contractionary pressures under exchange rate shocks in developing countries.

The current study also opens some new venues for future research such as the distributional impacts of exchange rate shocks and currency crises on domestic and foreign firms, and on the long run portfolio allocation decisions of foreign firms. Does the superior performance of foreign firms cause a crowding out or crowding in of domestic firms? What is the extent to which foreign firms help mitigate the contractionary effects of exchange rate shocks on the overall economy? In addition, while overcoming several limitations of the previous research by including both publicly traded and non-traded firms, and by controlling for endogeneity, path dependence, and reverse causality, the paper does not provide any answer on the growth responses of small and medium sized firms to exchange rate shocks.

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## **Appendix**

### **1. 2-Digit manufacturing industry classification (ISIC revision 3 code D)**

15 - Manufacture of food products and beverages

16 - Manufacture of tobacco products

17 - Manufacture of textiles

18 - Manufacture of wearing apparel; dressing and dyeing of fur

19 - Tanning and dressing of leather; manufacture of luggage, handbags, harness and footwear

20 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

21 - Manufacture of paper and paper products

22 - Publishing, printing and reproduction of recorded media

23 - Manufacture of coke, refined petroleum products and nuclear fuel

24 - Manufacture of chemicals and chemical products

25 - Manufacture of rubber and plastics products

26 - Manufacture of other non-metallic mineral products

27 - Manufacture of basic metals

28 - Manufacture of fabricated metal products, except machinery and equipment

29 - Manufacture of machinery and equipment n.e.c.

30 - Manufacture of office, accounting and computing machinery

31 - Manufacture of electrical machinery and apparatus n.e.c.

32 - Manufacture of radio, television and communication equipment and apparatus

34 - Manufacture of motor vehicles, trailers and semi-trailers

35 - Manufacture of other transport equipment

36 - Manufacture of furniture; manufacturing n.e.c.

Table 1: Summary statistics

10% Ownership												
year	Number of Firms		Median Growth Rate of				Median Level of					
			Employment		Sales		Employment		Assets		Sales	
	D	F	D	F	D	F	D	F	D	F	D	F
1993	292	75	-0.004	0.011	0.116	0.147	465	535	23.821	24.217	24.148	24.663
1994	294	84	-0.014	-0.064	-0.121	-0.239	468	514	23.843	24.047	24.087	24.428
1995	313	87	0.038	0.006	0.094	0.127	492	514	23.916	24.275	24.149	24.454
1996	331	91	0.045	0.019	0.066	0.104	530	516	24.027	24.354	24.195	24.503
1997	394	105	0.038	0.060	0.089	0.116	505	488	23.984	24.311	24.108	24.597
1998	394	121	0.009	0.039	0.020	0.044	506	485	24.021	24.248	24.170	24.447
1999	396	124	-0.014	-0.004	-0.050	-0.034	490	462	23.984	24.190	24.091	24.412
2000	393	122	0.005	0.000	-0.011	0.021	510	495	24.022	24.095	24.059	24.413
2001	380	122	-0.037	-0.039	0.009	-0.046	500	511	23.959	24.115	24.071	24.423
2002	359	120	0.016	-0.009	-0.012	0.002	514	502	23.913	24.139	24.084	24.430
2003	340	117	0.016	0.029	-0.024	-0.002	542	533	23.953	24.075	24.063	24.412
2004	331	107	0.036	0.034	0.097	0.107	612	521	24.162	24.207	24.195	24.461
2005	315	95	0.017	0.024	-0.004	0.026	599	548	24.193	24.419	24.235	24.534
Mean	349	105	0.015	0.007	0.005	0.024	731	789	24.031	24.289	24.209	24.593
25% Ownership												
year	D	F	D	F	D	F	D	F	D	F	D	F
1993	308	59	-0.003	0.009	0.113	0.159	487	520	23.871	24.177	24.173	24.716
1994	311	67	-0.014	-0.068	-0.121	-0.251	480	441	23.853	24.017	24.094	24.321
1995	327	73	0.039	0.000	0.094	0.143	500	487	23.924	24.275	24.167	24.405
1996	341	81	0.045	0.019	0.061	0.109	530	502	24.047	24.340	24.201	24.484
1997	409	90	0.042	0.060	0.084	0.131	505	488	23.996	24.289	24.118	24.627
1998	410	105	0.009	0.029	0.020	0.044	509	481	24.025	24.225	24.180	24.447
1999	412	108	-0.013	-0.007	-0.058	-0.029	490	451	23.994	24.233	24.094	24.444
2000	408	107	0.002	0.000	-0.012	0.03	511	475	24.023	24.094	24.070	24.415
2001	394	108	-0.038	-0.032	0.005	-0.016	500	511	23.952	24.138	24.071	24.436
2002	373	106	0.016	-0.015	-0.012	0.003	514	502	23.913	24.233	24.084	24.530
2003	353	104	0.020	0.022	-0.023	-0.001	542	518	23.948	24.194	24.061	24.499
2004	340	98	0.034	0.042	0.096	0.107	612	521	24.156	24.258	24.189	24.528
2005	322	88	0.019	0.021	0.000	0.024	597	549	24.178	24.457	24.235	24.571
Mean	362	92	0.015	0.006	0.004	0.032	731	799	24.035	24.315	24.217	24.619

Notes: Growth rates are in log differences. *D* and *F* refer to domestic and foreign firms.

Table 2: Summary statistics

10% Foreign Ownership											
year	Median Levels of								Total		
	Profitability		Productivity (logs)		Export Share		Leverage		Share of Foreign Firms In:		
	D	F	D	F	D	F	D	F	Employment	Sales	Exports
1993	0.098	0.125	17.979	18.389	0.070	0.070	0.705	0.727	0.256	0.334	0.287
1994	0.138	0.104	17.868	18.117	0.190	0.150	0.705	0.724	0.253	0.300	0.277
1995	0.132	0.170	17.895	18.232	0.170	0.160	0.553	0.571	0.226	0.307	0.289
1996	0.098	0.141	17.851	18.255	0.180	0.190	0.602	0.568	0.215	0.313	0.293
1997	0.078	0.134	17.818	18.349	0.200	0.170	0.623	0.583	0.221	0.338	0.279
1998	0.051	0.117	17.842	18.368	0.205	0.160	0.598	0.584	0.243	0.358	0.297
1999	0.029	0.073	17.830	18.290	0.190	0.140	0.637	0.630	0.244	0.351	0.353
2000	0.036	0.090	17.875	18.263	0.195	0.155	0.625	0.602	0.245	0.360	0.349
2001	0.016	0.031	17.849	18.320	0.265	0.280	0.670	0.617	0.260	0.356	0.384
2002	0.053	0.086	17.831	18.275	0.245	0.310	0.581	0.613	0.256	0.379	0.432
2003	0.053	0.098	17.813	18.230	0.270	0.280	0.533	0.500	0.268	0.411	0.450
2004	0.038	0.110	17.878	18.296	0.270	0.220	0.485	0.408	0.254	0.410	0.463
2005	0.026	0.084	17.876	18.279	0.240	0.205	0.477	0.395	0.255	0.401	0.471
mean	0.067	0.115	17.912	18.217	0.274	0.278	0.634	0.589	0.246	0.355	0.356
25% Foreign Ownership											
year	D	F	D	F	D	F	D	F	Employment	Sales	Exports
1993	0.108	0.116	17.987	18.404	0.070	0.070	0.702	0.745	0.200	0.284	0.192
1994	0.137	0.120	17.881	18.141	0.195	0.130	0.706	0.720	0.195	0.234	0.172
1995	0.131	0.177	17.882	18.233	0.180	0.140	0.562	0.544	0.190	0.265	0.207
1996	0.098	0.162	17.851	18.297	0.180	0.160	0.602	0.551	0.192	0.289	0.252
1997	0.076	0.150	17.820	18.402	0.200	0.165	0.624	0.567	0.194	0.306	0.238
1998	0.052	0.120	17.853	18.402	0.210	0.160	0.594	0.586	0.213	0.326	0.257
1999	0.029	0.073	17.837	18.306	0.190	0.125	0.635	0.631	0.210	0.319	0.312
2000	0.036	0.098	17.883	18.278	0.200	0.140	0.622	0.605	0.218	0.335	0.320
2001	0.016	0.031	17.849	18.327	0.265	0.285	0.670	0.617	0.234	0.336	0.368
2002	0.052	0.096	17.831	18.294	0.250	0.300	0.581	0.613	0.232	0.356	0.407
2003	0.053	0.104	17.812	18.266	0.270	0.280	0.535	0.494	0.244	0.388	0.430
2004	0.039	0.117	17.871	18.339	0.270	0.215	0.485	0.400	0.240	0.395	0.442
2005	0.027	0.093	17.874	18.308	0.240	0.200	0.476	0.394	0.243	0.388	0.454
mean	0.066	0.125	17.914	18.253	0.275	0.273	0.637	0.572	0.216	0.325	0.312

Notes: *Profitability* is the net profits before taxes to (end of last period) total assets ratio, *Productivity* is real output per worker, *Export share* is the share of exports in total sales; *Leverage* is the debt to total assets ratio. *Total Share of Foreign Firms* is the share of foreign firms among sample firms.

Table 3: Summary statistics: Publicly traded firms

10% Ownership												
year	Number of firms		Median Growth Rate of				Median Level of					
			Employment		Sales		Employment		Assets		Sales	
	D	F	D	F	D	F	D	F	D	F	D	F
1993	63	16	-0.011	-0.032	0.137	0.091	503	1339	24.250	25.330	24.680	25.659
1994	69	17	-0.025	-0.134	-0.207	-0.358	541	1200	24.258	24.963	24.425	25.268
1995	85	17	0.006	-0.032	0.091	0.150	588	858	24.327	24.908	24.530	25.279
1996	90	19	0.030	0.017	0.072	0.110	570	945	24.431	24.947	24.514	25.272
1997	103	23	0.043	0.003	0.091	0.075	573	712	24.503	24.682	24.541	25.248
1998	102	31	0.009	0.015	-0.019	-0.017	562	663	24.540	24.661	24.546	24.990
1999	100	31	-0.027	-0.058	-0.082	-0.098	527	762	24.574	24.771	24.293	24.994
2000	109	33	-0.006	-0.033	-0.037	0.003	535	770	24.420	24.624	24.270	24.954
2001	107	35	-0.051	-0.063	-0.052	-0.148	469	605	24.335	24.533	24.284	24.571
2002	102	36	-0.010	-0.025	-0.063	-0.017	455	561	24.255	24.452	24.227	24.581
2003	98	34	0.000	-0.012	-0.050	-0.051	495	566	24.162	24.508	24.104	24.691
2004	98	31	0.026	0.012	0.077	0.130	612	521	24.411	24.714	24.287	24.787
2005	96	29	0.004	0.019	-0.002	0.037	597	664	24.440	24.822	24.305	24.873
Mean	94	27	-0.025	-0.029	-0.053	-0.004	800	1142	24.369	24.704	24.281	24.777
25% Ownership												
year	D	F	D	F	D	F	D	F	D	F	D	F
1993	67	12	-0.009	-0.034	0.133	0.095	509	1530	24.344	25.443	24.680	25.858
1994	74	12	-0.032	-0.174	-0.211	-0.398	551	1248	24.358	24.980	24.477	25.350
1995	89	13	0.009	-0.042	0.113	0.122	588	1296	24.404	25.257	24.530	25.377
1996	94	15	0.030	0.009	0.072	0.114	592	807	24.431	25.403	24.522	25.693
1997	108	18	0.043	0.003	0.071	0.097	566	766	24.498	25.171	24.533	25.521
1998	109	24	0.009	0.015	-0.015	-0.034	556	716	24.540	24.755	24.576	25.136
1999	108	23	-0.021	-0.081	-0.080	-0.110	531	700	24.558	24.876	24.293	25.168
2000	117	25	-0.009	-0.029	-0.037	0.023	536	750	24.436	24.860	24.281	25.191
2001	114	28	-0.053	-0.046	-0.054	-0.161	474	602	24.335	24.638	24.298	24.716
2002	110	28	-0.009	-0.041	-0.063	-0.009	455	561	24.233	24.501	24.211	24.740
2003	103	29	0.000	-0.020	-0.047	-0.056	510	533	24.150	24.526	24.124	24.703
2004	100	29	0.026	0.012	0.077	0.130	612	521	24.381	24.872	24.287	24.789
2005	98	27	0.002	0.035	-0.002	0.048	597	664	24.399	24.945	24.305	25.014
Mean	99	22	-0.024	-0.036	-0.051	-0.001	799	1227	24.362	24.818	24.291	24.852

Notes: For variable definitions refer to Table 1 and 2.



Table 4: Summary statistics: Publicly traded firms

10% Foreign Ownership														
year	Median Levels of								Total Share of Publicly Traded Firms in:					
	Profitability		Productivity (logs)		Export Share		Leverage		Employment		Sales		Exports	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F
1993	0.221	0.183	18.282	18.440	0.060	0.040	0.649	0.718	0.159	0.104	0.223	0.145	0.159	0.080
1994	0.214	0.185	18.085	18.121	0.140	0.170	0.634	0.725	0.175	0.093	0.216	0.103	0.152	0.076
1995	0.200	0.290	18.131	18.534	0.130	0.180	0.464	0.519	0.216	0.074	0.250	0.104	0.208	0.094
1996	0.163	0.194	18.017	18.441	0.125	0.200	0.506	0.506	0.215	0.076	0.238	0.107	0.210	0.110
1997	0.112	0.186	17.999	18.454	0.140	0.180	0.535	0.481	0.232	0.076	0.246	0.114	0.219	0.088
1998	0.082	0.147	17.921	18.368	0.160	0.155	0.530	0.447	0.235	0.090	0.230	0.125	0.206	0.110
1999	0.027	0.096	17.862	18.306	0.175	0.160	0.599	0.562	0.231	0.088	0.217	0.129	0.182	0.123
2000	0.042	0.115	18.032	18.457	0.150	0.140	0.580	0.508	0.233	0.096	0.227	0.148	0.197	0.146
2001	0.006	0.020	17.974	18.348	0.240	0.240	0.669	0.571	0.230	0.101	0.218	0.150	0.181	0.173
2002	0.055	0.077	17.865	18.294	0.230	0.290	0.561	0.559	0.229	0.098	0.213	0.155	0.186	0.187
2003	0.062	0.079	17.822	18.244	0.230	0.250	0.506	0.445	0.227	0.099	0.204	0.174	0.181	0.194
2004	0.062	0.063	18.002	18.399	0.230	0.183	0.450	0.347	0.239	0.094	0.214	0.173	0.178	0.197
2005	0.029	0.084	17.944	18.366	0.200	0.180	0.449	0.306	0.237	0.101	0.225	0.183	0.185	0.210
mean	0.057	0.125	17.985	18.141	0.235	0.246	0.651	0.549	0.220	0.091	0.225	0.139	0.188	0.137
25% Foreign Ownership														
year	D	F	D	F	D	F	D	F	D	F	D	F	D	F
1993	0.214	0.239	18.282	18.494	0.06	0.040	0.649	0.745	0.183	0.079	0.244	0.124	0.178	0.061
1994	0.217	0.177	18.099	18.153	0.140	0.160	0.638	0.723	0.201	0.067	0.241	0.078	0.177	0.050
1995	0.201	0.211	18.135	18.323	0.130	0.180	0.465	0.462	0.225	0.065	0.261	0.092	0.222	0.080
1996	0.163	0.270	18.017	18.491	0.150	0.130	0.511	0.504	0.227	0.064	0.248	0.097	0.227	0.092
1997	0.111	0.293	18.001	18.473	0.160	0.100	0.537	0.420	0.240	0.068	0.256	0.105	0.232	0.075
1998	0.082	0.158	17.933	18.385	0.160	0.100	0.531	0.420	0.246	0.078	0.242	0.112	0.221	0.095
1999	0.034	0.087	17.886	18.382	0.180	0.150	0.593	0.576	0.248	0.070	0.232	0.114	0.205	0.100
2000	0.042	0.134	18.048	18.463	0.150	0.130	0.579	0.504	0.248	0.080	0.241	0.133	0.221	0.122
2001	0.008	0.012	17.982	18.339	0.240	0.240	0.641	0.588	0.244	0.087	0.229	0.139	0.193	0.161
2002	0.055	0.086	17.865	18.383	0.230	0.290	0.569	0.544	0.242	0.084	0.223	0.145	0.196	0.176
2003	0.056	0.103	17.852	18.330	0.230	0.260	0.509	0.423	0.238	0.087	0.214	0.164	0.188	0.187
2004	0.062	0.077	18.002	18.437	0.230	0.183	0.450	0.337	0.241	0.091	0.216	0.171	0.179	0.196
2005	0.029	0.103	17.944	18.417	0.200	0.180	0.449	0.297	0.240	0.098	0.227	0.181	0.186	0.208
mean	0.057	0.140	17.987	18.174	0.24	0.226	0.655	0.509	0.233	0.078	0.237	0.127	0.202	0.123

Table 5: Firm growth and exchange rate uncertainty

<i>Foreign Equity Share</i>	10%			25%		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>LD</i>	0.05** (0.025)	0.051** (0.025)	0.050** (0.025)	0.047* (0.025)	0.048* (0.025)	0.047* (0.025)
<i>Volatility</i>	-26.176*** (6.797)	-29.909*** (7.700)	-33.304*** (8.832)	-27.800*** (6.878)	-32.337*** (7.853)	-36.777*** (9.020)
<i>RER</i>	0.033 (0.057)	0.032 (0.056)	0.033 (0.056)	0.018 (0.058)	0.016 (0.058)	0.017 (0.057)
<i>Foreign</i>	-0.083*** (0.026)	-0.078*** (0.026)	-0.093*** (0.035)	-0.096*** (0.028)	-0.093*** (0.028)	-0.112*** (0.036)
<i>Volatility*Foreign</i>	48.119*** (16.065)	43.717*** (16.142)	53.678** (21.852)	57.031*** (17.731)	52.642*** (17.773)	66.550*** (23.437)
<i>Size</i>	0.004 (0.004)	0.007* (0.004)	0.007* (0.004)	0.004 (0.004)	0.007* (0.004)	0.007* (0.004)
<i>Industry</i>	0.058 (0.054)	0.054 (0.055)	0.051 (0.054)	0.067 (0.055)	0.063 (0.055)	0.059 (0.053)
<i>Wages</i>	-0.05 (0.082)	-0.045 (0.084)	-0.045 (0.084)	-0.059 (0.082)	-0.053 (0.083)	-0.057 (0.083)
<i>Sales</i>	0.224*** (0.079)	0.230*** (0.079)	0.233*** (0.078)	0.220*** (0.078)	0.228*** (0.077)	0.230*** (0.077)
<i>Stock Market</i>		-0.049*** (0.010)	-0.065*** (0.015)		-0.052*** (0.010)	-0.069*** (0.014)
<i>Volatility*Stock Market</i>		14.410** (6.169)	25.273*** (8.505)		16.812*** (6.171)	28.424*** (8.439)
<i>Foreign*Stock Market</i>			0.064* (0.036)			0.079** (0.038)
<i>Volatility*Foreign*Stock Market</i>			-42.371* (22.147)			-56.236** (23.267)
<i>AR(2)</i>	0.603	0.573	0.655	0.648	0.607	0.76
<i>Hansen</i>	0.801	0.794	0.784	0.803	0.802	0.796
<i>obs</i>	4831	4831	4831	4831	4831	4831
<i>groups</i>	585	585	585	585	585	585
<i>instruments</i>	66	68	70	66	68	70
<i>Impact factor</i>						
<i>Domestic</i>	-4.163	-2.465	-1.277	-4.422	-2.469	-1.329
<i>Non-Traded</i>		-4.757	-5.297		-5.143	-5.849
<i>Foreign</i>	3.49	4.488	0.521	4.649	5.904	0.312
<i>Non-Traded</i>		2.196	3.240		3.230	4.735

Notes: Two-step system GMM results using Windmeijer finite-sample correction. Unless otherwise stated, all growth rates are measured by logarithmic differences. (\*\*\*), (\*\*), (\*) refer to significance at 1, 5 and 10 percent levels respectively. *LD* is the lagged dependent variable; *Volatility* is real exchange rate volatility; *RER* is the growth rate of real effective exchange rate; *Foreign* is a dummy variable taking 1 for firms with 10% (25%) or higher foreign ownership at time  $t$ ; *Size* is the log of total assets; *Industry* is the output growth in two-digit manufacturing industries, wages are two-digit manufacturing sector real wage growth; *Sales* is the net sales growth; *Stock Market* is a dummy variable taking 1 for stock market listed firms at time  $t$ . All regressions include an (unreported) constant variable. Impact factor is the impact of one-standard deviation increase in *Volatility* on employment growth. *Hansen* is Hansen tests of over-identifying restrictions, *m1* and *m2* are standard AR(1) and AR(2) tests, and. All test statistics are given by their p-values. *Obs* is number of observations, *Groups* is the number of cross-section units, *Instruments* is number of instruments used. *Domestic* and *Foreign* refer domestically and foreign owned publicly traded firms. *Domestic non-traded* and *Foreign non-traded* refer to domestically and foreign owned non-publicly traded firms.

Table 6: Firm growth, exchange rate uncertainty and export orientation

<i>Foreign Equity Share</i>	10%		25%	
	(1)	(2)	(3)	(4)
<i>LD</i>	0.045*	0.044*	0.042*	0.043*
	(0.025)	(0.025)	(0.025)	(0.025)
<i>Volatility</i>	-33.491***	-25.297**	-34.784***	-23.530**
	(10.940)	(11.127)	(11.208)	(10.795)
<i>RER</i>	-0.248***	-0.220**	-0.267***	-0.224**
	(0.091)	(0.093)	(0.092)	(0.093)
<i>Foreign</i>	-0.078***	-0.067***	-0.088***	-0.051***
	(0.026)	(0.021)	(0.029)	(0.019)
<i>Volatility*Foreign</i>	43.300***	18.380*	50.173***	13.527
	(16.558)	(9.804)	(18.951)	(9.543)
<i>Sales</i>	0.241***	0.256***	0.239***	0.263***
	(0.087)	(0.084)	(0.088)	(0.084)
<i>Exports<sub>-1</sub></i>	-0.097**	-0.155***	-0.103**	-0.134**
	(0.045)	(0.057)	(0.046)	(0.055)
<i>RER*Exports<sub>-1</sub></i>	1.213***	1.481***	1.243***	1.478***
	(0.319)	(0.334)	(0.318)	(0.333)
<i>Volatility*Exports<sub>-1</sub></i>	51.795**	65.813**	54.677**	58.883**
	(25.444)	(30.794)	(25.684)	(29.482)
<i>Foreign*Exports<sub>-1</sub></i>		0.243***		0.184***
		(0.071)		(0.068)
<i>Volatility*Foreign*Exports<sub>-1</sub></i>		-62.561*		-44.032
		(34.069)		(34.359)
<i>RER*Foreign*Exports<sub>-1</sub></i>		-0.938***		-0.992***
		(0.261)		(0.266)
<i>Firm &amp; Industry Controls</i>	Yes	Yes	Yes	Yes
<i>AR(2)</i>	0.536	0.503	0.547	0.454
<i>Hansen</i>	0.732	0.743	0.709	0.722
<i>obs</i>	4764	4764	4764	4764
<i>groups</i>	585	585	585	585
<i>instruments</i>	69	72	69	72
<i>Impact factor</i>				
<i>Domestic: 10<sup>th</sup></i>	-5.327	-4.023	-5.532	-3.743
<i>90<sup>th</sup></i>	-1.053	1.407	-1.021	1.116
<i>Foreign: 10<sup>th</sup></i>	1.560	-1.100	2.448	-1.591
<i>90<sup>th</sup></i>	5.834	-0.832	6.959	-0.366

Notes: *Exports* is the log of one plus the share of exports in total sales; *Leverage* is the log of external debt to total assets ratio, *Firm and Industry Controls* include *Size*, *Industry* and *Wages*. For variable definitions see Table 5.

Table 7: Firm growth, exchange rate uncertainty and leverage

<i>Foreign Equity Share</i>	10%		25%	
	(1)	(2)	(3)	(4)
<i>LD</i>	0.043*	0.041*	0.04	0.038
	(0.025)	(0.025)	(0.025)	(0.025)
<i>Volatility</i>	-39.178***	-39.016***	-40.646***	-40.131***
	(10.547)	(13.370)	(10.621)	(14.219)
<i>RER</i>	-0.055	-0.026	-0.075	-0.001
	(0.085)	(0.182)	-0.087	(0.195)
<i>Foreign</i>	-0.079***	-0.127***	-0.092***	-0.149***
	(0.026)	(0.049)	(0.028)	(0.053)
<i>Volatility*Foreign</i>	45.286***	64.698*	53.346***	89.084**
	(16.073)	(37.238)	(17.787)	(40.069)
<i>Sales</i>	0.215***	0.223***	0.214***	0.220***
	(0.078)	(0.078)	(0.076)	(0.075)
<i>Leverage<sub>-1</sub></i>	0.033*	0.054	0.033*	0.033
	(0.018)	(0.077)	(0.018)	(0.083)
<i>Volatility* Leverage<sub>-1</sub></i>	-25.441***	-38.146*	-25.988***	-35.348
	(9.518)	(21.316)	(9.634)	(23.190)
<i>RER*Leverage<sub>-1</sub></i>	-0.159*	-0.173	-0.172*	-0.092
	(0.093)	(0.335)	(0.093)	(0.355)
<i>Foreign*Leverage<sub>-1</sub></i>		-0.140***		-0.143**
		(0.053)		(0.056)
<i>Volatility*Foreign* Leverage<sub>-1</sub></i>		74.437**		95.735***
		(33.587)		(36.398)
<i>RER*Foreign* Leverage<sub>-1</sub></i>		0.151		0.101
		(0.225)		(0.230)
<i>Firm &amp; Industry Controls</i>	Yes	Yes	Yes	Yes
<i>AR(2)</i>	0.622	0.638	0.663	0.719
<i>Hansen</i>	0.833	0.809	0.823	0.802
<i>obs</i>	4814	4814	4814	4814
<i>groups</i>	585	585	585	585
<i>instruments</i>	69	71	69	71
<i>Impact factor</i>				
<i>Domestic: 10<sup>th</sup></i>	-1.193	1.349	-1.318	0.617
<i>90<sup>th</sup></i>	-5.779	-5.527	-6.003	-5.754
<i>Foreign: 10<sup>th</sup></i>	6.010	-3.102	7.166	-4.172
<i>90<sup>th</sup></i>	1.424	3.439	2.482	6.712

Notes: *Leverage* is the debt to asset ratio. For other variable definitions see Table 5.

Table 8: Firm growth, exchange rate uncertainty, and profitability and productivity differences

<i>Foreign Equity Share</i>	10%		25%		10%		25%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>LD</i>	0.038 (0.025)	0.037 (0.025)	0.035 (0.025)	0.034 (0.024)	0.030 (0.026)	0.029 (0.025)	0.026 (0.025)	0.026 (0.025)
<i>Volatility</i>	-21.541*** (6.732)	-26.963*** (8.666)	-22.171*** (6.813)	-28.991*** (8.878)	-22.903*** (6.467)	-29.806*** (8.316)	-24.026*** (6.374)	-31.274*** (8.329)
<i>RER</i>	0.058 (0.056)	0.063 (0.055)	0.049 (0.057)	0.053 (0.056)	0.047 (0.054)	0.050 (0.053)	0.037 (0.054)	0.042 (0.053)
<i>Foreign</i>	-0.077*** (0.026)	-0.081** (0.035)	-0.085*** (0.028)	-0.094** (0.036)	-0.112*** (0.025)	-0.123*** (0.031)	-0.124*** (0.025)	-0.134*** (0.032)
<i>Volatility*Foreign</i>	40.690** (16.158)	41.753* (21.798)	45.609*** (17.934)	50.087** (23.595)	50.230*** (14.794)	55.883*** (19.593)	57.061*** (15.693)	61.747*** (20.433)
<i>Sales</i>	0.187** (0.074)	0.203*** (0.074)	0.189*** (0.073)	0.202*** (0.072)	0.199** (0.078)	0.216*** (0.078)	0.203*** (0.076)	0.222*** (0.076)
<i>Profitability<sub>-1</sub></i>	0.119*** (0.022)	0.127*** (0.022)	0.121*** (0.021)	0.128*** (0.021)				
<i>Productivity<sub>-1</sub></i>					0.072*** (0.009)	0.075*** (0.009)	0.072*** (0.009)	0.075*** (0.009)
<i>Stock Market</i>		-0.066*** (0.015)		-0.068*** (0.014)		-0.073*** (0.015)		-0.074*** (0.015)
<i>Volatility*Stock Market</i>		21.459*** (8.306)		23.398*** (8.279)		25.267*** (8.161)		26.409*** (8.002)
<i>Foreign*Stock Market</i>		0.051 (0.036)		0.058 (0.038)		0.073** (0.034)		0.077** (0.034)
<i>Volatility*Foreign* Stock Market</i>		-31.826 (22.287)		-41.239* (23.523)		-45.597** (20.199)		-52.169** (20.668)
<i>Firm &amp; Industry Controls</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>AR(2)</i>	0.646	0.65	0.661	0.717	0.81	0.728	0.802	0.69
<i>Hansen</i>	0.942	0.935	0.938	0.938	0.551	0.591	0.567	0.589
<i>obs</i>	4762	4762	4762	4762	4765	4765	4765	4765
<i>groups</i>	585	585	585	585	582	582	582	582
<i>instruments</i>	67	71	67	71	67	71	67	71
<i>Impact factor</i>								
<i>Domestic</i>	-3.426	-0.875	-3.526	-0.889	-3.643	-0.722	-3.821	-0.774
<i>Non-Traded</i>		-4.288		-4.611		-4.741		-4.974
<i>Foreign</i>	3.046	0.703	3.728	0.518	4.346	0.914	5.254	0.750
<i>Non-Traded</i>		2.352		3.355		4.148		4.847

Notes: *Profitability* is net profits before taxes divided by total assets at time  $t-1$  in natural log;

*Productivity* is real output per worker in natural log. For other variable definitions see Table 5.

Table 9: Firm growth during currency crises

<i>Foreign Equity Share</i>	10%		25%	
	(1)	(2)	(3)	(4)
<i>LD</i>	0.047*	0.048*	0.047*	0.047*
	(0.025)	(0.025)	(0.025)	(0.025)
<i>Foreign</i>	-0.011*	-0.013*	-0.016**	-0.017**
	(0.007)	(0.0080)	(0.007)	(0.007)
<i>Crises</i>	-0.065***	-0.071***	-0.065***	-0.071***
	(0.020)	(0.022)	(0.020)	(0.022)
<i>Foreign*Crises</i>	0.034**	0.037*	0.043**	0.042*
	(0.017)	(0.021)	(0.019)	(0.022)
<i>Sales</i>	0.197**	0.207**	0.193**	0.203**
	(0.089)	(0.089)	(0.089)	(0.089)
<i>Stock Market</i>		-0.032***		-0.031***
		(0.008)		(0.007)
<i>Crises*Stock Market</i>		0.021		0.020
		(0.017)		(0.017)
<i>Foreign*Stock Market</i>		-0.001		-0.017
		(0.014)		(0.023)
<i>Crises*Foreign*Stock Market</i>		-0.006		0.009
		(0.034)		(0.037)
<i>Firm &amp; Industry Controls</i>	Yes	Yes	Yes	Yes
AR(2)	0.679	0.654	0.678	0.643
Hansen	0.832	0.835	0.819	0.822
obs	4832	4832	4832	4832
groups	585	585	585	585
instruments	74	78	74	78
impact factor				
Domestic	-6.260	-4.729	-6.309	-4.882
Non-Traded		-6.881		-6.875
Foreign	-2.788	-1.502	-1.949	0.380
Non-Traded		-3.100		-2.559

Notes: *Crises* is a dummy variable taking the value of one for 1994 and 2001. All regressions include time dummies. For other variable definitions see Table 5.