Preliminary

An Analysis of the Effects of Financial Market Imperfections on Indian Firms' Exporting Behavior

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Abstract

Using the data of more than 5,000 manufacturing firms in India for 1994–2008, we investigate the impact of financial constraint on the exporting behavior of Indian manufacturing firms. We also examine how it affects the link between the exchange rate movement and exports. We find that there is a strong degree of persistency in the exporting behavior among Indian manufacturing firms; once a firm becomes an exporter, with the probability of over 70%, it will remain in the export market. The persistency in the exporting decision reflects the high fixed costs of entering foreign markets for Indian firms. A firm with a higher amount of net cash flows and smaller debt-to-asset ratios is more likely to become an exporter, indicating that a firm tends to self-finance its exporting without relying too much on external finances. We find evidence, through industry specific analysis, that the Indian financial system is not sufficiently developed to funnel funds to the industry that needs external finance. Internal funds are especially important for firms that are not incumbent exporters to become exporters. When we divide the sample period into several sub-periods, small firms are found to become more reliant on internal funds while both large and small firms become more risk averse in the last period. This suggests that Indian financial liberalization does not allow the financial system to meet the stronger demand for funds by firms, especially small ones, which therefore try to self-finance. The stronger demand for funds also seems to be met by funds provided by foreign institutions. Lastly, those firms that are able to respond to the exchange rate movement are the ones that hold ample cash and do not hold high debt. Our clear evidence that Indian firms are still highly reliant upon internal financial resources and less capable of using external finances suggests that establishing the functionality of financial markets in India is an urgent issue.

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1. Introduction

There has been a strong emphasis on export promotion for economic development in the policy-making community, especially in developing countries. The economic success of the countries in East Asia, most notably China, has been viewed as convincing evidence that an economy with a strong export sector can achieve successful economic development. Currently, in the aftermath of the most severe and persistent crisis since the Great Depression, many policy makers around the globe think economic recovery hinges upon the recovery of exports of major economies, which includes developing countries such as the BRICS countries – China, Russia, India, and South Africa. Though in a different way, the emphasis on export performance continues to receive spotlight.

The strong emphasis on export promotion is not free of problems, however. Heavy reliance on export promotion can lead to misallocations of resources as well as to an unbalanced economic development in terms of both geographical and socioeconomic income distribution. Recently, currency maneuverings by emerging market economies, or the allegations thereof, have created political tensions as most exemplified by the U.S.-China trade relationship. Some observers argue that the efforts by emerging market economies in East Asia, China in particular, to sustain undervalued levels of their currencies through foreign exchange interventions have contributed to increasing the level of liquidity in the global markets and thereby to creating the housing bubble in several industrialized countries, notably including the United States. Nonetheless, it is not an exaggerated generalization that developing countries tend to focus on growth through export promotion and also seem to have the “fear of appreciation” (Levy-Yeyati and Sturzenegger, 2007).

All these arguments are based on one simple theoretical prediction: weaker currency values lead to export growth and an improvement of net exports. Although this positive link

between currency depreciation and (net) exports does not seem to be challenged in the policy arena, the academic literature is more of a mixed bag; some studies find a statistically significant correlation while others find no significant relationship (such as Duttagupta and Spilimbergo, 2004).

The weak empirical evidence can be somewhat reconciled by adding two more variables in the discussion. The first is the impact of the fixed cost of entering a foreign market. Bernard and Wagner (2001) or Bernard and Jensen (2004) find persistency in the export status of firms in Germany and the United States, respectively, interpreting that to be indicative of the fixed cost of entering the export market. Given the needs for additional market research, modifications in the production process for localized products, and any other regulatory and socio-cultural difficulties to enter a foreign market, high fixed costs for export market entry are highly plausible. These high fixed costs, in turn, weaken the link between fluctuations in currency value and the performance of exports. In a macroeconomic sense, the fixed costs of market entry can explain the famous J-curve effect.

Another factor is financial development, or conversely, the existence of financial constraint. This is closely related to the empirical evidence of entry cost; to overcome high market entry cost to become exporters, firms need financing from the capital market. In a country where firms are not able to effectively obtain necessary funds at reasonable prices from the financial markets (due to government regulations, lack of resources, etc.), firms can be discouraged to enter the export market even when relative prices change in favor of their products. Financial constraint can be more important for firms in the industry that is more reliant on external finances (Rajan and Zingale, 1998). Chaney (2005) develops a theoretical model to predict that firms' exporting behavior can be affected by their productivity and liquidity, and finds that liquidity constraints can prevent productive firms from entering the export market.

Using a rich firm-level dataset from the EU area, Stiebale (2008) provides evidence that financial conditions affect firms' decisions to enter foreign markets. Hence, financial constraint is an important factor for firms' deciding to become an exporter, and it can affect the link between currency depreciation and exports.

Berman and Berthou (2009) investigate how the lack of financial development can affect the link between exchange rate movements and exports using data for 27 industrialized and developing countries. They find that for countries with credit constraints, currency depreciation could lead to a smaller increase or even a decrease in exports. However, investigating with aggregated, country-level data may mask the complex interactions between firms' exports and their determinants. The authors admit that investigations with firm-level data, that can capture firms' production levels, exports, and other characteristics such as their financial conditions, would be an ideal.

In this study, we will empirically investigate the impact of financial constraint on the exporting behavior of Indian manufacturing firms and also examine how it affects the link between the exchange rate movement and exports. We will use comprehensive firm-level data on Indian manufacturing firms available in a database called the "PROWESS" database, that contains a record of accounting and financial information for more than 5,000 firms operating in India. Using this dataset, we will examine how financial conditions of Indian firms affect the probability of their entry to the export market and their export volume. For the theoretical foundation for the estimation, we will follow Campa (2004) who examined the link between firms' exporting behavior and the exchange rate movement. We will add one more aspect of firms' decision making on export market participation by including a set of variables that reflect financial conditions of Indian firms.

Investigating Indian firms' corporate finance and exporting behavior is a good case

study of how financial development can affect the way firms react to exchange rate movement in developing countries, where export promotion is often a priority in their national economic policy agendas. Many researchers have pointed out that corporate finance in developing countries is highly reliant on funds generated internally. The same generalization applies to India.[1] But at the same time, since 1993, India has implemented a series of financial reforms and developed its financial markets significantly. The country's exports have grown dramatically during the same period – trade liberalization policy was implemented in the early 1990s, including a policy allowing the India rupee to float in 1993. Dynamic changes have occurred in the environment surrounding Indian firms, and the firms must have optimally responded to the changes. Thus, findings from this sort of study can provide some lessons for other developing countries.

This study makes several important contributions to the literature. First, this study adds to the empirical literature utilizing micro-level data to examine the effect of financial development on macroeconomic variables. While there is longstanding literature on the link between financial development and economic development, the empirical literature has tended to use aggregated data. As Levine (2005) argues, firms should be directly affected by financial development or liberalization, and therefore, firm-level analyses may be better to unravel the nuance effect of financial development. Recently, many studies have appeared investigating the effect of financial development or constraint at the firm-level, but many papers tend to focus on industrialized countries because of data availability.[2] Bhaduri (2005) and Gosh (2006) both

[1] Allen et al. (2008) show that 78% of Indian firms are owned by individuals or family members while the same figure for Chinese firms is 21% and 51% (30%) for medium (large)-size firms in their sample of emerging market countries (excluding India and China).

[2] Of course, there are notable studies investigating the impact of finance on growth or other macroeconomic variables for developing countries, including Beck et al. (2001), Forbes (2007), Gallego and Loayza (2001), Love (2003), Laeven (2003), and Schmukler and Vesperoni (2001). However, firm-level data from developing countries are usually limited.

investigate the impact of financial liberalization on financial constraint, but focus on the investment supply function.

Second, this paper will contribute to the literature on the link between financial development and firms' exports behavior that is relatively new, most exemplified by Chaney (2005) and Manova (2009). Again, in this literature also, most studies focus on the experience of industrialized countries due to data availability. As far as we are aware of, there is no study that looks into the effect of corporate finance on the exporting behavior of Indian firms.

Third, the same characterization of scope applies to the literature on the trade elasticities to relative price variations. Campa (2004) tests the famous hysteresis hypothesis (Dixit, 1989) that in order to become an exporter, a firm must bear the fix cost of entering the foreign market. Applying a discrete dynamic choice model to Spanish firm data, he finds that export market participation of the firms is persistent, indicating the high fixed cost of market entry. Guillou (2008) applies Campa's estimation model to French firms. Both studies show that it is the volatility of the exchange rate, not necessarily the rate of depreciation per se, that affects firms' decision of entering the export market, but that, once the firms become exporters, the rate of currency depreciation does affect the exporting behavior.

Although many researchers have identified that the fixed cost of entering foreign markets is an important determinant for firms, and that exports should react to changes in relative prices, few have attempted to look into these two factors jointly. The last and most important contribution of this study is that our paper examines the determinants of the exporting behavior, in terms of both export market participation and export volumes, while focusing on both financial factors and exchange rate movements.

In Section 2, we will briefly review Campa's model, which will be our theoretical foundation to describe firms' behavior with regard to exporting. Section 3 introduces the

PROWESS database and presents some summary statistics pertaining to the variables of our focus. We present our basic empirical model in Section 4, followed by discussions on the estimation results. We will make concluding remarks in Section 5.

2. Theoretical Foundation

2.1 Theoretical Framework

We base our theoretical foundation for the estimation exercise on Campa's (2004) dynamic discrete choice firm model. This model allows us to incorporate the fixed or sunk cost of entering and exiting a foreign market. Although Campa did not pay attention to the financial conditions that firms face, we assume that this model can incorporate firms' accessibility to finances as a factor that affects the fixed cost of market entry (and exit). Following Guillou (2008), we focus on the share of production that will be exported, or export intensity (γ_{it}), as a proxy for export volumes of an Indian firm.[3] Hence, firm *i* maximizes the expected revenue (R_{it}) given the information set Ω_{it} while determining whether to serve the export market – the indicator variable I_{it} takes the value of one if firm *i* exports at time *t*, zero otherwise – and how much to export (γ_{it}) if it exports. The objective function of firm *i* can be described as:

$$V_{it}(\Omega_{it}) = \max_{I_{it},\gamma_{it},Q_{it}} E_t\left[\sum_{j=t}^{\infty} \delta^{j-t} R_{ij}(I_{ij},\gamma_{ij},Q_{it}) \,\middle|\, \Omega_{it}\right] \qquad (1)$$

where δ is the one-period discount factor and Q_{it} is the total production of firm *i* at time *t*.

When we define the fixed cost of entry to the export market as F_i and the fixed cost of market exit as G_i, then the net revenue from exporting can be expressed as:

[3] We will define export intensity as the ratio of sales from exports to total sales. For the estimation, we measure "exports" as the sum of "earning from exporting goods" and "earning from exporting services." We focus on this variable instead of export volumes because export volumes are difficult to obtain at the firm-level.

$$R_{it}\left(I_{ij},\gamma_{ij},Q_{it}\right)=\pi_{it}^{d}\left[\left(1-\gamma_{it}\right)Q_{it}\right]+I_{it}\left[\pi_{it}^{x}\left(\gamma_{it}Q_{it,}e_{kt}\right)-F_{i}\left(1-I_{it-1}\right)\right]-G_{i}I_{it-1}\left(1-I_{it}\right) \quad (2)$$

where $\pi_{it}^{d},\pi_{it}^{x}$ are the gross profits from production for the domestic and export markets, respectively, and e_{kt} is the exchange rate for industry *k* at time *t*. The revenue depends upon whether the firm exported last period or not (i.e., whether I_{it-1} = 0 or 1).

Applying the Bellman equation to equation (1), the firm's behavior will become:

$$V_{it}\left(\Omega_{it}\right)=\max_{Ii_{j},\gamma_{ij},Q_{ij}}\left[R_{it}\left(I_{it},\gamma_{it},Q_{it}\right)+\delta E_{t}\left(V_{it+1}\left(\Omega_{it+1}\right)\right)|\,I_{it}\right] \quad (3).$$

We can solve this equation for the first order condition and get the following export participation rule. That is, firm *i* will decide to enter the export market only when the following is true:

$$\begin{aligned}\pi_{it}^{d}\left[\left(1-\gamma_{it}\right)Q_{it}\right]+\pi_{it}^{x}\left(\gamma_{it}Q_{it},e_{it}\right)+\delta\left[E_{t}\left[V_{it+1}\left(\Omega_{it+1}\right)|\,I_{it}=1\right]-E_{t}\left[V_{it+1}\left(\Omega_{it+1}\right)|\,I_{it}=0\right]\right]\\ \geq F_{i}-\left(F_{i}+G_{i}\right)I_{it-1}\end{aligned} \quad (4).$$

Now, a firm's decision to enter or exit the foreign market is affected by the current value of the exchange rate and its volatility while the volume of the exports, which we capture as export intensity, should be affected by primarily the exchange rate movement, not its volatility. Furthermore, the conditions of the financial markets are embedded in the information set Ω_{it}, and they can affect the firms' decisions of market entry and exit given the existence of the fixed cost. In a market with no financial constraint, the conditions of the financial markets are homogeneous to the firms, which means that financial market conditions do not affect the optimization process. However, in a financially constrained market, the accessibility to funds becomes binding for each firm. If firms are able to borrow from financial markets or to self-finance with cash flows or retained profits, they can maximize profits while potential

competitors are being kept out of the foreign markets due to the inability to finance the sunk cost. In this case, the larger the fixed or sunk costs of entering a market are, the more credit constraint would matter. Hence, if a firm is financially constrained, exchange rate movement as well as its volatility may not matter because firms may not be able to take the advantage of changes in their price competitiveness.[4]

2.2 Theoretical Predictions of the Variables

We review theoretical predictions of the variables that can be included in the information set Ω_{it} and can affect the decision making by firms regarding whether and how much to export.

Export market participation in the previous year (t – 1), or I_{t-1}*:* When a firm's decision to enter the export market is affected by the fixed cost of entering the market, export market participation should be persistent. Hence, if the export market participation in the previous year, I_{t-1}, is found to significantly affect the current decision to enter or stay in the foreign market, that would indicate the Dixit (1989) type of fixed cost is involved.[5]

Net cash flow: Firms in financially repressed markets (due to government regulations or other anti-competitive policies) find it difficult to get funds from financial markets, which is often the case in developing countries. In such markets, firms tend to rely on their own cash holdings. As a result, heavy reliance on internal finance can be observed as high volumes of net

[4] Campa's paper looks into the data on Spanish manufacturers while Guillou's into those on French firms. In both papers, financial conditions are not investigated. However, given that these papers investigate industrialized countries, it may not be a big issue. Stiebale (2008) on the other hand finds financial constraint matters for the decision making of entering foreign markets by the firms in the EU countries.

[5] Dixit argues that the size of the interval between the exchange rates that trigger market entry and exit is an increasing function of uncertainty arising from exchange rate volatility. A firm has an "option" of deciding to enter the export market today (incurring corresponding entry costs) or to wait for another period. If it decides to wait, the firm will again observe a realization of the exchange rate and then decide whether to enter the market. Applying a standard option theory in financial economics, Dixit shows that the value of the option (of whether to enter the export market) increases with the degree of exchange rate uncertainty.

cash flows or retained earnings. In the empirical literature, the amount of net cash flow is often used as a proxy for financial constraint. A significantly positive estimated coefficient on the variable for net cash flow or retained profits should indicate that firms are self-financing and therefore facing financial constraints.

Debt-to-asset ratio: In a market where external finance is relatively accessible, a firm can get funds from the financial market to enter a foreign market or meet changes in the demand for its exporting product, which makes the debt-to-asset ratio positively correlated with exports. In a financial market with less friction, higher debt-to-asset ratios, i.e., higher leverages, can be correlated with higher probabilities of entering foreign markets and higher volumes of exports. However, in a financially constrained market, a firm cannot get external finances easily and may also be risk averse in its financing decisions. Hence, a risk-averse firm may try to minimize its reliance on debt issuance even when it wants to start or expand its exports, which can make the correlation between the debt-to-asset ratio and exports either insignificant or even negative.

Firm size: A larger firm can internally share risks and therefore may be able to make a risky decision such as entering a foreign market. It may also be able to internalize the sunk cost of entering a foreign market. Thus, one can expect a positive correlation between firm size and the probability of entering the export market and the volumes of exports.

Firm age: Older firms usually hold a stock of business know-hows and network of connections, both of which may facilitate entry to new markets. However, older firms may have more established customer base in the domestic market, so they may be less inclined to take risks and enter new markets. Hence, the expected sign of this variable is ambiguous.

Profitability: The profitability of a firm should affect the decision to enter the export market as well as the volumes of exports in the same way it affects its decisions on investment. Also, higher profitability may function as collateral for financing through increased present

values of future income flows. Furthermore, higher profitability may also help increase internal earnings that can be used as internal finances.

Productivity: Productive firms should be competitive in terms of providing innovative products and lowering production costs, both of which may allow them to penetrate into foreign markets. As was the case with profitability, firms may collateralize future income that arises from their innovative products, management, and production processes.[6]

Foreign borrowing: Borrowings from foreign firms or financial institutions can make it easier for a firm to obtain not only funds for exploring foreign markets but also managerial knowledge, know-hows pertaining to particular foreign markets, and network of business connections useful for marketing, all of which can contribute to greater export incentives. This can be more directly applied to firms that are owned by foreign firms.

Industrial group: The network effect can be also obtained from industrial groups or conglomerate a firm belongs to. In India, several industrial groups exist and are major players in some industries, as is the case in Korea (*chaebols*) and Japan (*keiretsu*). Industrial groups may also alleviate financial constraints of their member firms through cross-subsiding group member firms.

3. Data and Summary Statistics

3.1 Data

We use a comprehensive database on Indian firms called "PROWESS." This database has been maintained by the Center for Monitoring Indian Economy (CMIE), and includes financial statements data for about 9,000 companies since the late 1980s. Careful analyses on the

[6] Muúls (2008) presents a theoretical model in which both productivity and financial constraints are incorporated in the firm's decision making on entering a foreign market. He also finds empirical evidence consistent with theoretical predictions using Belgian firm-level data.

firms included in this database can be found in Allen et al. (2009), Oura (2008), and Shah, et al. (2008).

From this database, we extract data on firms from five industries: food and beverages, chemical, metal, machinery, and textiles. The firms in the original dataset account for about 75% of entire non-financial sectors. Although the original data are available since 1989, because we focus on the period in the aftermath of the comprehensive financial reforms in 1993, our sample starts in 1994. In order to exclude obvious outliers and unrealistic observations, we follow the steps specified in Appendix 1 to construct the sample for estimations.

After removing the outliers and unrealistic observations, we have 43,209 firm-years with 5,220 firms for the period 1994 – 2008. The numbers of the firms included in the sample for each of the five industries are shown in Table 1.

For other data, the consumer price index is retrieved from the IMF's International Financial Statistics. The country-level trade data are extracted from the United Nations' Comtrade database. More details on the data definitions and sources can be found in Appendix 2.

3.2 Summary Statistics

Because Allen et al. (2009), Oura (2008) and Shah, et al. (2008) conduct comprehensive and up-to-date analyses on the Indian firms included in the Prowess database, we will focus on the summary statistics of several variables relevant to the exporting behavior of Indian firms.

We measure the extent of export intensity as the share of earnings from exporting goods and services in the total sales. Figure 1 illustrates the development of the export intensity ratios for the full sample as well as the subsamples of "large" and "small" firms – large firms refer to those whose assets are greater than the median in a year.[7] As a whole, more and more Indian

[7] This means that a firm can become a large or small firm over different years.

firms are exporting since the early 1990s, though the tendency is more noticeable among large firms. Among different industries in our sample, according to Figure 2, the textile industry has been the largest exporting industry where about 20% of total sales are from exports. Meanwhile, chemical, metal, and machinery industries have been on the rising trend. Food and beverages industry, on the other hand, reduced its export share in the late 1990s and has since been stable.

While entering a foreign market is not an easy thing for many firms, mainly due to the high fixed cost of market entry as we have discussed in the theoretical section, once a firm becomes an exporter, it tends to continue to be one. Figure 3 highlights the highly persistent exporting behavior of Indian firms. Panel (a) shows the transition rates for time $t+1$ of the incumbent exporters as of time t – "incumbent" meaning those which are exporters as of time t – while Panel (b) shows for the non-incumbent exporters. In the figure, we can see that the persistency in the exporting behavior has been increasing for incumbent exporters in recent years; in the last three years, about 95% of incumbent exporting firms tend to remain in the export market in the following year while less than 90% of them remained as exporters in the mid-1990s. In most of the sample period, only 10% of the firms that are not exporters become exporters and its rate has been slightly declining in the last few years. These figures signify the difficulty of entering foreign markets and thereby suggest the significant role the fixed cost of foreign market entry plays in the decision making process of Indian manufacturing firms.

Given the high hurdle to become exporters, exporters and non-exporters should be facing different economic and financial conditions. Figure 4 shows that the size of total assets for exporters is much greater than that of non-exporting firms. Furthermore, the asset size of exporters has been expanding more rapidly in recent years. A similar trend can be observed for the respective sales of exporters and non-exporters (Figure 5). The profitability of exporting firms has been rising in recent years after some retrenchment in the late 1990s, which must be

correlated with the rising export intensity (Figure 6).

A number of other financial conditions differ between exporters and non-exporters. According to Figure 7, the debt-to-asset ratios are much higher for non-exporters. In a well-developed financial market, a firm can become an exporter by becoming highly leveraged and using future revenues from exports as collaterals. However, in a financially constrained market, firms cannot afford to take high leverages, and therefore may tend to be risk averse, i.e., avoid taking too much debt with respect to its asset size. Given the level of financial development in India, it is more natural to think that Indian firms tend to be risk averse, and that only those which hold conservative financial stance are able to become exporters. In such an environment, firms need to rely on funds internally available, such as net cash flows and retained profits, as confirmed by Figures 8 and 9.

Recent financial liberalization policies have given Indian firms a new source of funding: foreign borrowing. Borrowings from foreign firms or financial institutions provide not only funds for exploring foreign markets but also managerial knowledge, know-hows pertaining to particular foreign markets, and network of people useful for marketing. Hence, one can expect firms that borrow from foreign firms to find it easier to penetrate into the export market. This prediction is confirmed by Figure 10 which illustrates exporters increased foreign borrowing significantly after 2004, while non-exporters did not.

4. Estimation

The informal analysis we just made only gives us some ideas about correlations between firms' exporting behavior and their potential determinants. To shed more light on the determinants, we need to conduct more formal analysis. For that, we again follow the estimation approach by Campa (2004) and Guillou (2008),

4.1 Estimation Models

For the estimation exercises, we will implement the Heckman (1979) model. The motivation is that we need to avoid the selection bias that may arise by just estimating the export volumes on potential determinants. Instead of excluding the firms that self-select not to export, we first apply the maximum likelihood estimations to the probit model with random effects to estimate the probability of export participation.[8] That is, the system of equations we estimate are:

$$I_{it} = \begin{cases} 1 & if\ \pi_{it}^{d}\left[(1-\gamma_{it})Q_{it}\right] + \pi_{it}^{x}(\gamma_{it}Q_{it}, e_{it}) + \delta\left[E_t\left[V_{it+1}(\Omega_{it+1})|I_{it}=1\right]\right] \\ & \qquad - E_t\left[V_{it+1}(\Omega_{it+1})|I_{it}=0\right] - F_i + (F_i + G_i)I_{it-1} \geq 0 \\ 0 & \text{otherwise.} \end{cases} \quad (5)$$

where the revenue is implicitly determined by:

$$R_{it} = Y_{it}'\mathrm{B} + \varepsilon_{it}\,. \quad (6)$$

The vector Y_{it} includes firm-specific characteristics such as firms' financial conditions, productivity, profitability, whether to belong to industrial groups, the ownership (i.e., foreign-owned, government-owned, or private-owned), the export participation in the previous period; and industry-specific characteristics such as industry-level effective exchange rates, their volatilities, and other characteristics that can be captured by industry-dummies.

We then estimate the second equation using the OLS method after controlling for the probability of firms' self-selecting into exporting. That is, we estimate the export intensity (γ_{it}) of exporter *i* at time *t* as:

[8] Because the error term v_{it} must be the sum of a firm-specific component and a white component, both of which are normally distributed, it is appropriate to estimate with random effects. See Campa (2004) for more discussions on the error term.

$$\gamma_{it} = \begin{cases} \alpha_0 + \alpha X_{it} + v_{it} & \text{if } I_{it} = 1, \\ 0 & \text{otherwise} \end{cases} \qquad (7)$$

where I_{it} follows equation (5). The vector X_{it} includes almost the same set of variables as in the information set Y_{it}. The only differences are that X_{it} includes the export intensity from the last period γ_{it-1} instead of the last period export participation indicator I_{it-1}; the exchange rate volatility is not included; and that the Mill's ratio from the probit estimation is included to take account of the selection bias. We control for the environmental changes that affect the Indian economy at the national level by including year-dummies. The estimation based on equation (7) will give us the elasticity of the explanatory variables for the firms that enter the export market while controlling for the probability of export market entry.

4.2 Estimation Results

4.2.1 Basic Estimations

The results from the first-stage probit estimation with random effects are reported in columns (1) and (2) of Table 2, and those from the second stage OLS estimation are in columns (1) and (2) of Table 3. In the tables with probit estimation results, the marginal effects of the estimated coefficients are reported.

There is a strong degree of persistency in the decision of export market entry. Once a firm becomes an exporter, with the probability of over 70%, it will remain in the export market. The persistency in the exporting decision reflects the fixed costs of entering foreign markets.

The significantly positive coefficient on the net cash flow (as a ratio to total assets) variable indicates that a firm with a higher amount of net cash flows is more likely to become an exporter, indicating that a firm tends to self-finance its exporting by holding ample cash flows.

Many studies have found similar evidence for firms' decision on investment, including Ghosh (2005) for Indian firms and Chan et al. (2010) for China.

The negative coefficient on the debt-to-asset ratio, on the other hand, suggests that Indian firms tend to be risk averse; the more debt they have, the less likely it is for the firms to become exporters. The results on both cash flow and the debt-asset ratio suggest that Indian firms are financially constrained.

Firms borrowing from abroad tend to become exporters, possibly because of closer ties with foreign firms and better accessibility to information on foreign markets. With similar reasons, foreign-owned firms tend to enter export markets – the probability of foreign-owned firms' entering the export market is greater than that of domestic counterparts by 15 percentage points. But government-own firms are much less like to become exporters – the probability of government-owned firms' entering the export market is lower than non-government-owned firms by as much as 24%. Firms with lower labor productivity and those with higher investment intensity are more likely to become exporters, supporting the hypothesis that firms with higher levels of productivity are more prone to export. Contrary to plausible expectation, belonging to a conglomerate does not seem to help a firm to become an exporter. This may be explained by the tendency of the conglomerates to focus on the domestic market where they may have more established presence and be able to exercise more market power through their industrial network.[9]

Interestingly, the effective exchange rate variable turned out to have a wrong sign: currency appreciation– which is shown as higher EER – encourages firms to enter export markets. The volatility of the effective exchange rates, which represents higher degree of

[9] This is confirmed by the significantly negative coefficient on the conglomerate variable in the OLS export intensity estimations shown in Table 3.

uncertainty and therefore reflects higher costs in entering a foreign market, appears to discourage firms to enter the export market, though the coefficient is not significant.

In the OLS estimation where we estimate the export intensity of the Indian firms, most of the variables that affect firms' decision of entering foreign markets are found to affect the volume of exports as well. In addition, older firms tend to export less with respect to the scale of their sales, indicating that younger firms are taking the advantage of recent liberalization of the Indian economy while older firms may have an established base in the domestic market. We continue to find no significant and reasonable effects on the exchange rate variables.

In an open-macro sense, it may be surprising to see that the exchange rate, whether its level or volatility, does not seem to matter for the exporting behavior of firms in India. For one thing, as our study and others have shown, the fixed cost of entering foreign markets is so high that fluctuations of relative prices matter less for the decision making of export market entry. Also, the lack of significant evidence for the exchange rate variable in the OLS export intensity estimation makes the role of financing appear more important. Hence, once the conditions of financial markets and other firm-specific characteristics such as profitability and labor or capital productivity are controlled for, the exchange rate variables no longer appear to affect firms' exporting decisions. Furthermore, in a constrained financial market, firms cannot expect a high degree of reliance on external finances, which makes it important for Indian firms to pool cash internally and avoid becoming too leveraged.

When we use the variable for retained profits (as a ratio to assets), instead of cash flows, to represent firms' efforts to self-finance, whose results are shown in Column (2) of Tables 2 and 3, we not only do not observe any changes in the behavior of other explanatory variables, but see more significance on the estimated coefficient for retained profits. These results also bolster the evidence that firms tend to rely upon their internal finances.

4.2.2 Does the Firm Size Matter?

The extent of getting financed externally from the capital market or raising funds internally can be a function of firm size. Many studies have shown that financial constraints affect different sizes of firms differently. As Love (2003) and others have found, smaller firms may face greater transaction costs relative to their size, and their smaller scale may expose them to greater information asymmetry. Smaller firms may not benefit from political connection or connections through industrial conglomerates, either. We group our sample firms into two subsamples depending on their total asset size. The subsample of "large" firms is composed of the firms whose total assets are equal to or above the median of total assets in each year, and the remaining is to be "small" firms.

Column (3) of Tables 2 and 3 report the estimation results for the probit and OLS estimations of the large firms, respectively, while column (4) of these tables report the results of the small firms. Cash flows continue to be a contributor to export market participation, but only with marginal significance and just for large firms. When retained profits are used as the measure of reliance on internal finances, the variable enters both subsamples with significantly positive estimates, but the magnitude of the estimate is much larger for large firms than that for small firms (not reported). The estimated coefficient on the debt-asset ratio is larger in magnitude for large firms than for small firms, suggesting that larger firms are more risk-averse than small firms. Interestingly, small firms are more reliant on foreign borrowing than larger ones, which also holds true in the export intensity estimation.

Table 2 shows that the probability of an incumbent small firm remaining to be an exporter in the next year is 73% ceteris paribus, higher than that of larger firms. The bigger coefficients (in magnitude) on foreign borrowing and foreign ownership for the small firm subgroup suggests that one of the more effective ways for small firms to remain as incumbent

exporters or to become exporters is to have close relationships or associations with foreign firms. Large firms, on the other hand, can rely more on internal finance than small firms, which may be explained by the size of the firms that allow larger firms to internalize or cross-subsidize the cost of entering or exiting from foreign markets. Small firms may not afford such a use of internal funds.

Lastly, the effective exchange rate does seem to matter for small firms' decision to become exporters, but with a wrong sign. The exchange rate volatility seems to discourage both large and small firms to enter the export market, but the estimated coefficients are insignificant for both subgroups.

4.2.3 Does the Exporting Behavior Differ Across Different Industries?

Firms' exporting behavior can surely differ among different industries owing to different industrial and market structures. Also, the effect of finance on exporting can differ because, as the seminal paper by Rajan and Zingale (1998) shows, the extent of reliance on finance differs across different industries. Using the Rajan and Zingale method and more recent data of U.S. firms, Oura (2008) updates the degree of external finance for different industries. According to her estimates, our five industries can be ranked in the order of higher reliance on external finance as chemical (6.20), food and beverages (0.53), metal (0.44), and textiles and machinery (both 0.19). However, these estimates are based on the U.S. data and therefore mean that the estimated degree of reliance on external finance refers to the level of reliance that can be only achieved in a frictionless financial market. Nonetheless, by re-estimating our regressions for each of the industries, we may be able to observe how financial conditions affect our sample industries which can be characterized by different degrees of reliance on external finance.

The estimation results for each of the five industries are reported in Tables 4 and 5.

Chemical industry, which is supposed to be most reliant on external finance based on Oura's estimates, appears to have a relatively lower level of export participation persistency. The estimated coefficient of the cash flow variable is greater in both magnitude and statistical significance compared to other industries (though the estimated coefficient is only marginally significant). Based on these findings, the low level of export participation persistency can be explained by financial constraints among chemical firms although their operation, by definition, requires high levels of external finances. In fact, firms in this industry are also found not to be sensitive to the exchange rate movement. The greater magnitude of the estimated coefficient on the debt-to-asset ratio compared to other industries indicates that firms in this industry are more risk averse than those in other industries. This is consistent with the conjecture of a high level of financial constraints in this industry, and suggests that the Indian financial system is not sufficiently developed to funnel funds to the industry that needs external finance. Along with the large size of the domestic market (Table 1), firms in this industry may make decisions on export market entry relying on the availability of cash flows, making the degree of persistency smaller.

Food and beverages and metal industries are found to be sensitive to the volatility of the exchange rate, and metal industry reacts to the exchange rate movement as theory predicts. Interestingly, these two industries do not rely upon internal finances as much as chemical industry. Considering that these two industries do not need external finances to the same extent of chemical industry, their decision to enter the export market does not have to hinge upon internal finances, implying that firms in these industries may face relatively less financial constraints. Hence, they can make the best use of price competitiveness when the exchange rate moves favorably for them. In fact, the export intensities of food and beverages and machinery industries are responsive to the exchange rate movement. We can suspect these two industries face more world competitions than either chemical or metal industry, and therefore that relative

price changes through the exchange rate movement are an important factor. But this generalization is not applicable to textiles industry where currency *appreciation* is found to lead to higher export intensity.

4.2.4 Any Behavioral Difference between Incumbent Exporters and Non-incumbent Exporters?

Given the persistency of incumbent exporters, we suspect that different sets of factors affect the incumbent exporters and non-incumbent exporters. To examine this, we restrict our estimation on two separate subgroups of firms, one group composed of firms that are not exporters in the previous year and the other of firms that were exporters in the previous year. Columns (1) and (2) of Table 6 report the results of the probit estimation for the non-exporters and the incumbent exporters, respectively, as of the previous year, while columns (3) and (4) report the results of the OLS export intensity estimations for these subgroups.

In column (1), firms with ample cash flows are more likely to enter the export market even if they are not exporters in the previous year, again signifying that Indian firms rely on internal finances. However, those firms that are already in the export market do not appear reliant on internal finances to remain in the export market. Instead, the level of profitability matters for their continuant presence in the export market. It also appears that having access to foreign borrowing allows both incumbent and non-incumbent exporters to become exporters in the following period though the effect is slightly greater for non-incumbent exporters. Younger firms tend to enter the export market even if they were not exporters in the previous year.

Once they become exporters, the volume of exports of the firms tends to be persistent (column (4)). Again, profitability is an important determinant of export volume. The size of debt (as a ratio to total assets) is negatively correlated with both the probability of becoming exporters

and the volume of exports for the new exporters (those which were non-exporters in the previous year), though it does not appear to matter for the export volumes of continuant exporters. These findings suggest that having healthy, or conservative, financial conditions is more important for new exporters than incumbent exporters.

4.3 Further Analyses

4.3.1 Impact of Financial Development and Liberalization

We shall now shed different light on the exporting behavior of Indian firms from policy perspectives.

First, we question whether recent policy development in India has had any impact of the stability of the explanatory variables. Our sample period corresponds to the period when India has implemented liberalization and deregulation policies pertaining to its financial system.[10] These policies are aimed to relax policy constraints on domestic and cross-border financial transactions. In other words, the main focus of these policies is to reduce the extent of financial repression. In fact, since the end of the 1990s, private credit has become increasingly available in the Indian economy reaching close to 50% of GDP by 2008, which would make one expect that more funds are available from the financial system (Figure 11).

Theoretically, in a frictionless financial market, internal and external funds are perfect substitutes (Modigliani and Miller, 1958), in which case firms' investment decision should be independent of their financing methods. However, considering that India's comprehensive financial reforms started only in 1993, financial repression must be still existent though its extent may have been gradually reduced due to financial reform policies. Hence, by re-estimating our

[10] See Panagariya (2008), Shah (2008), and Hutchison et al. (2010) for an overview of India's financial reform and liberalization policies.

models for several subgroups of the sample period, we may be able to identify the impact of financial reform policies. For example, if financial reform policies have reduced frictions in the market over time, the extent of reliance on internal finances may have declined over time. Also, financial liberalization policies may have contributed to more foreign borrowing.

To examine the impact of financial reforms, we divide the sample period into three five-year periods of 1994-98, 1999-2003, and 2004-08 and re-estimate for each of the subperiods. Given the high level of persistency in the exporting behavior, we think that the analysis on export market participation is more informative. Hence, we repeat only the probit estimation and report the results in Table 7. Many studies have also found that the reaction to financial liberalization policies can differ depending on the size of the firm (such as Ghosh, 2006 and Chan et al. 2010), so we repeat the same exercise for the subsample of "large" and "small" firm groups and report the results in Table 8.

First of all, the degree of persistency to remain in the export market has been increasing over years. In 1994-98, once a firm becomes an exporter, the probability of remaining in the export market was about 74%. But in the most recent 2004-08 period, the probability is as high as 80%. This finding reflects the recent success of Indian exporters.

Theoretically, one might expect a firm in a financially repressed market to become less reliant upon internal finances given that financial liberalization would make it easier for firms to get funds from the capital market. However, our estimation shows an opposite result; the cash flow ratio becomes a significantly positive contributor to export market participation in the last period. This result is consistent with the increasing corporate saving by Indian firms in recent years, which our estimations indicate may have contributed to raising the probability of entering the foreign market. Also, it may indicate that the development of the Indian financial sector is not catching up with the strong demand by potential exporters, thus giving only limited opportunities

for firms and consequently leading them to self-finance to become exporters. As a matter of fact, Table 8 shows that small firms are much more reliant on cash flows than large firms in the last period; the estimated coefficient of the cash flow variable is not only statistically significant for the former subgroup, but also large in magnitude by three-folds compared to the large firm subgroup.

In the most recent period, foreign borrowing has become more important for both large and small firms. While the estimated coefficient on the foreign borrowing variable increased both its magnitude and statistical significance in 2004-08 for both subgroups, the increase in magnitude is larger for small firms. Also, whether a firm is owned by foreign firms still matters for small firms in the last period, but it is no longer an influential factor for larger firms. These findings imply that recent financial development in India benefit large firms through more available external finances and foreign borrowing. Smaller firms on the other hand seem to face more financial constraint when funds must have become more available. At the very least, small firms in India do not appear to be reaping the benefit of recent financial development and liberalization.

As far as the effect of the exchange rate movement is concerned, our findings indicate that firms were risk averse to the volatility of the exchange rate in the 1994-98 period. However, since then, the exchange rate does not appear to affect the firms' exporting behavior in term of either its level or volatility. The lack of link between the exchange rate movement and the export behavior may be closely and interactively related to the availability of funds for Indian firms, which we will examine in the next subsection.

4.3.2 Interactions between the Exchange Rate Movement and Corporate Finance

So far, we have only found weak evidence as to the impact of the exchange rate

movement on the exporting behavior of Indian firms. However, we have also found that there is a high degree of persistency in the exporting behavior, signifying the significant effect of the fixed cost of entering foreign markets. At the same time, Indian firms, especially smaller ones in recent years, appear to be facing financial constraints. Whether the presumably high fixed cost of entering the export market is funded externally or internally, as long as a firm has a better access to funds, then it should be able to take the advantage of a change in the relative price of their output prices. Hence, the effect of the exchange rate movement on the exporting behavior can be conditional on the accessibility to funds, which suggests that we examine the interaction between the exchange rate movement and the conditions of corporate finance.

While including an interaction term between the exchange rate variable and variables for corporate finance can be an ideal, interacting the exchange rate variable that is an industry-level variable with corporate finance variables that are firm-specific variables will yield misleading estimations due to multi-collinearity. Hence, we divide the sample into four groups depending on whether firms has high or low levels of cash flows (e.g., higher or lower than the median) – as a proxy for financial constraint – and whether they have high levels of debt-asset (leverage) ratios – as a proxy for reliance external finances.

The matrix of the four subsample groups is presented in Table 9. Subgroup (1) includes firms with high levels of cash flow and high levels of debt. We suspect these firms face less financial constraint, and better accessibility to external finances. The high level of cash flows can also be driven more by high levels of profitability. Subgroup (2) includes firms with high levels of cash flows and low debt, representing firms with high levels of financial constraint. Subgroup (3) refers to firms with low cash flows and large debt, which are the firms that face lesser financial constraint and better access to external finances. Finally, subgroup (4) represents low cash flows and low debt, referring to the firms that are financially conservative and risk averse.

For each subsample, we will focus on the estimated coefficient on the exchange rate variable, and examine how the coefficients differ across different subgroups. Since firms with better access to finances, either internally or externally, should be able to take the advantage of relative price changes, subgroups 1 through 3 should have a statistically significant coefficient on the exchange rate, indicating that firms' exporting behavior does respond to relative prices changes. More strictly, in a financial market with little friction, where external funds are available, the exchange rate variable should behave as theory predicts in subgroups (1) and (2). In a market with much friction, internal finances are more important and firms tend to be more risk averse, i.e., maintain low levels of leverages, the coefficient on the exchange rate variable should become significant in subgroup (3). In sum, comparing the magnitude and significance of the estimated coefficient of the exchange rate variable across different subgroups should give us some story about how Indian firms get financed.

We estimate the basic export market participation model for the four subgroups and report the results in Table 10. We also repeat the same exercise separately for the "large" firms group and the "small" firms group and report the results in Tables 10 (b) and (c), respectively.

The estimated coefficients of both the effective exchange rate variable and the exchange rate volatility variable are negative in subgroups (2) and (4), though only the estimated coefficient of the volatility term in subgroup (4) is statistically significant. At least, it seems that maintaining low leverage, or being risk-averse in borrowing, is important for a firm's ability to respond to the exchange rate movement. Column (2) shows weak evidence that when a firm holds ample cash while trying to be conservative about borrowing externally, it could react to the exchange rate movement as theory predicts; currency appreciation and high volatility in the exchange rate movement discourages its entry to foreign market.

Large firms do seem to respond to the exchange rate movement as long as they hold

ample cash and stay conservative in borrowing externally; firms would enter the export market when the currency depreciates and becomes less volatile. Firms with lows levels of cash flows and with conservative external finances would respond only to the exchange rate volatility; when the exchange rate become less volatile, would the firms tend to enter the export market. While this is also true for small firms with low levels of cash flows and low debt-to-asset ratios (subgroup (4)), small firms with high levels of cash flows and low debt-to-asset ratios (subgroup (2)) do not behave in the same way as large firms with the same conditions. Interestingly, the coefficient for foreign borrowing for this group of small firms is particularly large in magnitude and statistically significant. For this group of firms, borrowing from foreign firms or financial institutions, which can arise because of their high levels of cash flows and low debt-to-asset ratios, plays an important role in deciding their exporting behavior, a consistent result with the previous analysis.

In sum, our analyses have shown that financial market imperfection is a severe issue in Indian corporate finance. Even though the Indian rupee has been floating since 1993, coinciding with the starting year of comprehensive financial reforms, as far as the supply side is concerned, firms do not appear to be able to respond to changes in the relative prices of their products as theory predicts. When firms want to take advantage of changes in relative prices, they would rather rely on their own internal funds rather than seeking funds from the financial markets.

5. Concluding Remarks

We examined the supply-side factors that affect the exporting behavior of Indian firms while focusing on the role of the exchange rate and financial conditions. Our estimation results suggest that the exchange rate, in terms of both its level and volatilities, plays only a limited role while financial conditions matter more for their exporting behavior. We also found much

evidence that Indian firms face financial constraints. This means that even if the Indian government had an intension to affect (or encourage) Indian firms' decision to enter foreign markets (by manipulating the currency value, for example), such a policy would hardly have any impact on the firms' decisions. Instead, our evidence clearly shows that Indian firms are still highly reliant upon internal financial resources and less capable of getting funds from the financial markets, all of which suggests that establishing the functionality of financial markets in Indian is more of an urgent issue.

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Appendix 1: Criteria for Creating the Sample

1. Firms from the industries in food and beverage, machinery, chemicals, Metals and Metal products, and textiles are included.

2. Financial firms are not included.

3. Exclude outliers and unrealistic observations. The criteria for exclusion are as follows:

    a) Profitability ratio (= Profits before interest and tax / total sales) < -10 or >50
    b) Total assets < 0
    c) Tangible assets < 0
    d) Net cash flow/assets ratio < -0.1 or > 2
    e) Debt-to-asset > 10
    f) Wage-to-sales ratio =0, or > 1.8
    g) Investment-to-sales ratio = 0, or <0

4. If the export data for a firm are available for less than 3 years, the firm is dropped from the sample.

Appendix 2: Data Description

Variable	*Definitions*
exporter_int	Export intensity, that is calculated as ([earnings from exporting goods] + [earnings from exporting services] / [Sales]).
exporter	Dummy for exporting firm *i* in year *t*. If exporter_int > 0, it is assigned the value of one, otherwise, zero.
csh_asset	Cash Flow/total assets
debt_asset	Debt-to-asset ratos
retprofits_asset	Ratio of retained profits to total assets (ratio)
lsize	Size measured in the natural log of assets
lage	Age (natural log)
profit	Profits before interest and tax divided by total assets
foreign	Dummy for foreign-own firms
government	Dummy for government-own firms
eer	Effective exchange rate (2005 = 100). Higher values indicate appreciation of the Indian currency against a basket of currencies of trading partners at the industry-level
Vol_eer	Volatility of EER; annual standard deviations of monthly rate of depreciation
wage_sales	Ratio of Total Wages to Sales; measure of labor productivity
inv_sales	Ratio of investment to sales; measure of capital productivity
ind_group	Dummy for industrial conglomerate. If a firm belongs to one of the following the industrial groups: Tata group, Birla Group (inc. Adhitya Birla Group, The G.P - C.K Birla Group, Yash Birla Group), Reliance Group, Thapar Group, Mahindra Group, Bajaj Group, Hero Group, Kirloskar Group, Essar Group, DCM Shriram Group, Jindal Group, Mittal Group, or Larsen & Toubro Limited.

Table 1: Firms in the Sample

Sample	Full	Food and Beverages	Chemicals	Machinery	Metals and metal products	Textiles
Firm-year	43.209	7,731	13,235	7,851	6,452	7,940
# of firms	5,220	988	1,545	903	821	963
Total assets as of 2008 (rs crore)		138,667.4	845,077.1	243,026.6	440,372.3	116,144.4
Total sales as of 2008 (rs crore)		164,621.5	1,174,630.0	215,004.1	319,261.5	85,414.16
Total exports as of 2008 (rs crore)		20,447.1	184,181.0	26,778.0	54,579.8	22,301.6

Table 2: Estimates of Export Market Participation (Probit Model with Random Effects)

	Full	Full	Large Firms	Small Firms
	(1)	(2)	(3)	(4)
Exporter (t-1)	0.721	0.714	0.679	0.731
	(0.006)***	(0.007)***	(0.012)***	(0.008)***
Cash Flow/Assets	0.090		0.062	0.067
	(0.054)*		(0.043)	(0.065)
Retained profits to asset ratio		0.144		
		(0.033)***		
Debt-Asset	-0.064	-0.063	-0.054	-0.039
	(0.010)***	(0.012)***	(0.010)***	(0.010)***
Foreign Borrowing / Debt	0.159	0.167	0.098	0.134
	(0.045)***	(0.044)***	(0.032)***	(0.061)**
Assets (ln)	0.107	0.110	0.041	0.090
	(0.005)***	(0.005)***	(0.004)***	(0.007)***
Age (ln)	-0.001	-0.003	0.005	-0.009
	(0.006)	(0.006)	(0.005)	(0.006)
Profitability	0.029	0.018	0.022	0.024
	(0.006)***	(0.007)***	(0.006)***	(0.006)***
Foreign-Own	0.154	0.155	0.076	0.120
	(0.022)***	(0.021)***	(0.011)***	(0.036)***
Govt-Own	-0.235	-0.242	-0.143	-0.102
	(0.032)***	(0.032)***	(0.031)***	(0.037)***
EER (ln)	0.122	0.154	-0.018	0.150
	(0.068)*	(0.067)**	(0.058)	(0.079)*
Volatility of EER	-0.855	-0.979	-0.783	-0.687
	(0.952)	(0.930)	(0.814)	(1.107)
Ratio of Total Wages to Sales	-0.187	-0.175	-0.144	-0.114
	(0.035)***	(0.035)***	(0.035)***	(0.034)***
Ratio of Investment to Assets	0.339	0.294	0.153	0.359
	(0.055)***	(0.052)***	(0.042)***	(0.072)***
Conglomerate	-0.022	-0.018	-0.021	0.038
	(0.027)	(0.027)	(0.018)	(0.040)
N	41552	43039	20378	21174
# of firms	5219	5216	2803	3648

Notes: The marginal effects of the estimated coefficients are reported * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 3: Estimates of Export Intensity (OLS)

	Full	Full	Large Firms	Small Firms
	(1)	(2)	(3)	(4)
Export Intensity	0.888	0.886	0.899	0.870
(t-1)	(0.004)***	(0.004)***	(0.005)***	(0.008)***
Cash Flow / Assets	0.005		0.008	0.003
	(0.007)		(0.008)	(0.014)
Retained profits to asset ratio		0.023		
		(0.004)***		
Debt-Asset	-0.003	-0.001	-0.003	-0.003
	(0.001)***	(0.001)	(0.002)	(0.001)**
Foreign Borrowing / Debt	0.026	0.025	0.022	0.040
	(0.006)***	(0.005)***	(0.006)***	(0.014)***
Assets (ln)	0.002	0.001	0.001	0.002
	(0.000)***	(0.000)***	(0.001)*	(0.001)**
Age (ln)	-0.003	-0.003	-0.004	-0.002
	(0.001)***	(0.001)***	(0.001)***	(0.001)**
Profitability	0.004	0.002	0.006	0.003
	(0.001)***	(0.001)*	(0.002)***	(0.001)**
Foreign-Own	-0.001	-0.001	-0.002	0.005
	(0.002)	(0.002)	(0.002)	(0.004)
Govt-Own	-0.010	-0.009	-0.013	0.002
	(0.002)***	(0.002)***	(0.002)***	(0.003)
EER (ln)	0.012	0.010	0.022	0.001
	(0.010)	(0.010)	(0.014)	(0.015)
Ratio of Total Wages to Sales	-0.001	0.002	-0.004	-0.001
	(0.005)	(0.005)	(0.007)	(0.006)
Ratio of Investment to Assets	0.038	0.035	0.030	0.040
	(0.007)***	(0.008)***	(0.009)***	(0.013)***
Conglomerate	-0.006	-0.004	-0.005	-0.004
	(0.002)**	(0.002)**	(0.003)*	(0.004)
Mills Ratio	-0.003	-0.004	-0.001	-0.005
	(0.001)***	(0.001)***	(0.001)	(0.001)***
Adj. R2	0.81	0.81	0.83	0.78
N	41552	43039	20378	21174

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 4: Estimates of Export Market Participation among Industries

	Chemical	Food & Beverages	Metal	Machinery	Textiles
	(1)	(2)	(3)	(4)	(5)
Exporter (t-1)	0.679	0.728	0.745	0.630	0.743
	(0.014)***	(0.016)***	(0.014)***	(0.021)***	(0.014)***
Cash Flow/Assets	0.122	0.127	-0.070	0.035	0.062
	(0.085)	(0.102)	(0.143)	(0.096)	(0.171)
Debt-Asset	-0.106	-0.056	-0.073	-0.042	-0.028
	(0.021)***	(0.025)**	(0.028)***	(0.019)**	(0.018)
Foreign Borrowing / Debt	0.158	0.067	0.181	0.063	0.330
	(0.074)**	(0.094)	(0.119)	(0.077)	(0.123)***
Assets (ln)	0.117	0.072	0.101	0.081	0.135
	(0.008)***	(0.008)***	(0.010)***	(0.009)***	(0.012)***
Age (ln)	0.005	-0.018	0.035	0.049	-0.037
	(0.012)	(0.010)*	(0.016)**	(0.013)***	(0.013)***
Profitability	0.020	0.025	0.034	0.037	0.015
	(0.010)*	(0.011)**	(0.017)**	(0.013)***	(0.013)
Foreign-Own	0.105	0.175	0.242	0.145	0.084
	(0.036)***	(0.057)***	(0.070)***	(0.027)***	(0.111)
Govt-Own	-0.328	-0.265	-0.050	-0.270	-0.147
	(0.061)***	(0.031)***	(0.080)	(0.065)***	(0.131)
EER (ln)	0.030	-0.658	-0.915	0.069	0.977
	(0.169)	(0.425)	(0.322)***	(0.076)	(0.171)***
Volatility of EER	0.920	-3.989	-8.539	-2.691	1.758
	(1.602)	(2.405)*	(2.845)***	(1.794)	(2.158)
Ratio of Total Wages to Sales	-0.271	-0.118	-0.127	-0.082	-0.270
	(0.070)***	(0.052)**	(0.098)	(0.068)	(0.087)***
Ratio of Investment to Assets	0.394	0.141	0.164	0.146	0.394
	(0.095)***	(0.111)	(0.140)	(0.134)	(0.111)***
Conglomerate	-0.187	0.084	0.043	-0.035	-0.067
	(0.074)**	(0.055)	(0.058)	(0.045)	(0.079)
N	12675	7436	6241	7473	7727
# of firms	1544	988	821	903	963

Notes: The marginal effects of the estimated coefficients are reported. * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 5: Estimates of Export Intensity among Industries

	Chemical	Food & Beverages	Metal	Machinery	Textiles
	(1)	(2)	(3)	(4)	(5)
Export Intensity (t-1)	0.905	0.857	0.898	0.854	0.897
	(0.007)***	(0.013)***	(0.014)***	(0.015)***	(0.007)***
Cash Flow/Assets	0.001	-0.007	0.005	0.010	0.029
	(0.014)	(0.018)	(0.017)	(0.011)	(0.023)
Debt-Asset	-0.006	-0.005	0.002	-0.000	-0.001
	(0.002)***	(0.004)	(0.002)	(0.003)	(0.002)
Foreign Borrowing / Debt	0.031	0.050	0.017	0.014	0.024
	(0.009)***	(0.020)**	(0.011)	(0.012)	(0.018)
Assets (ln)	0.001	0.002	0.001	-0.002	0.006
	(0.001)	(0.001)**	(0.001)	(0.001)*	(0.001)***
Age (ln)	-0.003	-0.002	-0.003	-0.003	-0.005
	(0.001)**	(0.001)	(0.002)**	(0.001)*	(0.002)**
Profitability	0.003	0.008	0.001	0.001	0.004
	(0.002)	(0.003)***	(0.002)	(0.003)	(0.002)*
Foreign-Own	-0.005	0.001	0.002	0.008	-0.017
	(0.002)*	(0.005)	(0.007)	(0.004)*	(0.019)
Govt-Own	-0.012	-0.010	-0.006	-0.005	-0.005
	(0.004)***	(0.004)***	(0.004)	(0.003)*	(0.008)
EER (ln)	-0.026	-0.111	0.008	-0.026	0.063
	(0.019)	(0.053)**	(0.029)	(0.009)***	(0.026)**
Ratio of Total Wages to Sales	0.012	-0.009	-0.005	-0.002	-0.018
	(0.010)	(0.008)	(0.008)	(0.012)	(0.014)
Ratio of Investment to Assets	0.069	-0.011	0.002	0.056	0.027
	(0.012)***	(0.019)	(0.013)	(0.022)***	(0.019)
Conglomerate	-0.009	0.007	-0.006	0.001	-0.021
	(0.004)**	(0.007)	(0.004)	(0.003)	(0.010)**
Adj. R^2	0.82	0.77	0.80	0.73	0.84
N	12675	7436	6241	7473	7727

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1. The Mills ratio is omitted from presentation. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 6: Incumbent Exporters vs. Non-incumbent Exporters

	Export Market Participation (Probit with random effects)		Export Intensity (OLS)	
	Non-exporters (t – 1)	Exporters (t – 1)	Non-exporters (t – 1)	Exporters (t – 1)
	(1)	(2)	(3)	(4)
Export Intensity (t-1)				0.888
				(0.005)***
Cash Flow/Assets	0.058	0.011	0.045	-0.007
	(0.026)**	(0.020)	(0.016)***	(0.010)
Debt-Asset	-0.020	-0.018	-0.010	0.002
	(0.006)***	(0.004)***	(0.005)**	(0.004)
Foreign Borrowing / Debt	0.055	0.039	0.044	0.026
	(0.026)**	(0.015)**	(0.016)***	(0.007)***
Assets (ln)	0.037	0.023	0.017	-0.002
	(0.002)***	(0.001)***	(0.008)**	(0.001)
Age (ln)	-0.012	0.004	-0.010	-0.002
	(0.003)***	(0.002)	(0.003)***	(0.001)**
Profitability	0.003	0.018	0.001	0.012
	(0.003)	(0.003)***	(0.001)	(0.004)***
Foreign-Own	0.056	0.030	0.018	-0.005
	(0.026)**	(0.004)***	(0.012)	(0.003)*
Govt-Own	-0.056	-0.076	-0.045	-0.005
	(0.007)***	(0.028)***	(0.019)**	(0.005)
EER (ln)	0.076	-0.012	0.003	0.041
	(0.039)*	(0.023)	(0.019)	(0.016)***
Volatility of EER	-0.445	-0.019		
	(0.519)	(0.327)		
Ratio of Total Wages to Sales	-0.059	-0.051	-0.022	0.010
	(0.019)***	(0.013)***	(0.013)	(0.015)
Ratio of Investment to Assets	0.124	0.073	0.051	0.055
	(0.027)***	(0.023)***	(0.026)**	(0.013)***
Conglomerate	-0.007	-0.012	-0.008	-0.004
	(0.016)	(0.011)	(0.004)**	(0.003)
N	18907	22645	18907	22645
# of firms	3726	3491	3726	3491
Adj. R^2			0.01	0.81

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1. The Mills ratio is omitted from presentation. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 7: Export Participation Estimation Across Different Time Periods

Probit Estimation with Random Effects

	1994-1998	1999-2003	2004-2008
	(1)	(2)	(3)
Exporter (t-1)	0.737	0.768	0.804
	(0.007)***	(0.006)***	(0.006)***
Cash Flow/Assets	0.033	0.106	0.183
	(0.079)	(0.103)	(0.077)**
Debt-Asset	-0.025	-0.055	-0.057
	(0.019)	(0.013)***	(0.012)***
Foreign Borrowing / Debt	0.045	0.104	0.193
	(0.107)	(0.076)	(0.052)***
Assets (ln)	0.074	0.075	0.069
	(0.005)***	(0.005)***	(0.005)***
Age (ln)	-0.006	0.010	-0.003
	(0.007)	(0.008)	(0.010)
Profitability	0.063	0.043	0.011
	(0.012)***	(0.009)***	(0.008)
Foreign-Own	0.133	0.119	0.076
	(0.026)***	(0.028)***	(0.035)**
Govt-Own	-0.167	-0.158	-0.216
	(0.039)***	(0.039)***	(0.042)***
EER (ln)	0.009	-0.357	-0.121
	(0.149)	(0.264)	(0.314)
Volatility of EER	-4.347	3.028	-3.254
	(1.317)***	(3.763)	(2.798)
Ratio of Total Wages to Sales	-0.028	-0.134	-0.168
	(0.056)	(0.044)***	(0.048)***
Ratio of Investment to Assets	0.260	0.545	0.320
	(0.073)***	(0.113)***	(0.083)***
Conglomerate	-0.005	-0.032	-0.036
	(0.031)	(0.032)	(0.036)
N	11836	14759	14957
# of firms	3499	4393	4083

Notes: The marginal effects of the estimated coefficients are reported. * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 8: Export Participation Estimation
Across Different Time Periods and Different Sizes of Firms

Probit Estimation with Random Effects

	1994-1998, Large (1)	1999-2003, Large (2)	2004-2008, Large (3)	1994-1998, Small (4)	1999-2003, Small (5)	2004-2008, Small (6)
Exporter (t-1)	0.729	0.749	0.750	0.718	0.747	0.805
	(0.012)***	(0.010)***	(0.011)***	(0.010)***	(0.009)***	(0.008)***
Cash Flow/Assets	0.170	0.042	0.068	-0.074	0.125	0.226
	(0.095)*	(0.095)	(0.056)	(0.096)	(0.128)	(0.107)**
Debt-Asset	-0.040	-0.045	-0.069	-0.009	-0.038	-0.038
	(0.019)**	(0.014)***	(0.015)***	(0.025)	(0.015)**	(0.012)***
Foreign Borrowing / Debt	0.028	0.077	0.114	0.152	0.073	0.172
	(0.084)	(0.067)	(0.037)***	(0.188)	(0.102)	(0.075)**
Assets (ln)	0.033	0.040	0.027	0.100	0.076	0.058
	(0.006)***	(0.006)***	(0.005)***	(0.012)***	(0.010)***	(0.008)***
Age (ln)	-0.008	0.008	0.004	-0.009	0.005	-0.010
	(0.007)	(0.008)	(0.008)	(0.009)	(0.010)	(0.012)
Profitability	0.023	0.030	0.019	0.085	0.038	0.002
	(0.011)**	(0.010)***	(0.008)**	(0.016)***	(0.011)***	(0.009)
Foreign-Own	0.071	0.091	0.031	0.135	0.057	0.116
	(0.019)***	(0.018)***	(0.022)	(0.049)***	(0.047)	(0.062)*
Govt-Own	-0.124	-0.091	-0.141	-0.086	-0.093	-0.119
	(0.039)***	(0.038)**	(0.043)***	(0.061)	(0.063)	(0.053)**
EER (ln)	-0.223	-0.353	-0.074	0.288	-0.183	-0.012
	(0.144)	(0.261)	(0.270)	(0.197)	(0.312)	(0.366)
Volatility of EER	-2.878	3.209	-3.250	-4.248	1.724	0.380
	(1.294)**	(3.792)	(2.414)	(1.725)**	(4.405)	(3.303)
Ratio of Total Wages to Sales	0.044	-0.186	-0.154	-0.019	-0.057	-0.125
	(0.064)	(0.053)***	(0.053)***	(0.070)	(0.047)	(0.050)**
Ratio of Investment to Assets	0.150	0.339	0.120	0.258	0.463	0.328
	(0.065)**	(0.100)***	(0.060)**	(0.104)**	(0.151)***	(0.120)***
Conglomerate	0.001	-0.036	-0.028	0.025	0.041	0.023
	(0.023)	(0.027)	(0.026)	(0.059)	(0.055)	(0.058)
N	5923	7261	7194	5913	7498	7763
# of firms	1734	2128	2076	2121	2619	2444

Notes: The marginal effects of the estimated coefficients are reported. * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 9: Matrix of Subsample Groups

	Cash flows ratio		
Debt-asset ratio		High	Low
	Large	(1) High Cash Flow Large Debt	(3) Low Cash Flow Large Debt
	Small	(2) High Cash Flow Small Debt	(4) Low Cash Flow Large Debt

Table 10: Estimates of Export Market Participation among Different Financial Conditions

(a) Full Sample

	High Cash Flows Large Debt-to-Asset	High Cash Flows Small Debt-to-Asset	Low Cash Flows Large Debt-to-Asset	Low Cash Flows Small Debt-to-Asset
	(1)	(2)	(3)	(4)
Exporter (t-1)	0.769	0.777	0.775	0.764
	(0.006)***	(0.006)***	(0.009)***	(0.010)***
Cash Flow/Assets	0.299	0.067	0.047	-0.191
	(0.108)***	(0.065)	(0.386)	(0.385)
Debt-Asset	-0.075	0.110	-0.044	0.038
	(0.013)***	(0.062)*	(0.016)***	(0.090)
Foreign Borrowing / Debt	0.114	0.116	0.224	0.214
	(0.068)*	(0.066)*	(0.096)**	(0.115)*
Assets (ln)	0.079	0.083	0.055	0.072
	(0.005)***	(0.006)***	(0.007)***	(0.007)***
Age (ln)	-0.029	0.006	0.013	0.018
	(0.008)***	(0.008)	(0.011)	(0.012)
Profitability	0.034	0.008	0.035	0.014
	(0.008)***	(0.014)	(0.009)***	(0.016)
Foreign-Own	0.138	0.104	0.076	0.151
	(0.036)***	(0.027)***	(0.052)	(0.036)***
Govt-Own	-0.130	-0.238	-0.094	-0.223
	(0.037)***	(0.042)***	(0.064)	(0.077)***
EER (ln)	0.248	-0.064	0.248	-0.070
	(0.112)**	(0.103)	(0.166)	(0.158)
Volatility of EER	0.828	-2.223	0.479	-6.455
	(1.571)	(1.601)	(2.035)	(2.237)***
Ratio of Total Wages to Sales	-0.141	-0.066	-0.255	-0.064
	(0.049)***	(0.053)	(0.068)***	(0.066)
Ratio of Investment to Assets	0.209	0.387	0.535	0.376
	(0.084)**	(0.106)***	(0.097)***	(0.139)***
Conglomerate	-0.056	0.006	-0.059	0.046
	(0.035)	(0.035)	(0.047)	(0.044)
N	14386	14290	7083	5793
# of firms	3763	3637	2506	2262

Notes: The marginal effects of the estimated coefficients are reported. * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 10 – con't: Estimates of Export Market Participation among Different Financial Conditions

(b) Large Firms

	High Cash Flows Large Debt-to-Asset	High Cash Flows Small Debt-to-Asset	Low Cash Flows Large Debt-to-Asset	Low Cash Flows Small Debt-to-Asset
	(1)	(2)	(3)	(4)
Exporter (t-1)	0.741	0.740	0.749	0.733
	(0.011)***	(0.013)***	(0.014)***	(0.021)***
Cash Flow/Assets	0.293	0.041	-0.175	-0.414
	(0.107)***	(0.050)	(0.347)	(0.294)
Debt-Asset	-0.065	0.036	-0.038	0.063
	(0.017)***	(0.053)	(0.019)**	(0.070)
Foreign Borrowing / Debt	0.130	0.026	0.163	0.134
	(0.066)*	(0.041)	(0.080)**	(0.075)*
Assets (ln)	0.036	0.035	0.030	0.025
	(0.007)***	(0.005)***	(0.007)***	(0.007)***
Age (ln)	-0.013	0.001	0.016	0.008
	(0.009)	(0.007)	(0.010)	(0.010)
Profitability	0.029	0.035	0.024	-0.009
	(0.010)***	(0.024)	(0.009)***	(0.017)
Foreign-Own	0.132	0.038	0.055	0.062
	(0.022)***	(0.016)**	(0.036)	(0.018)***
Govt-Own	-0.094	-0.174	-0.030	-0.105
	(0.041)**	(0.043)***	(0.051)	(0.062)*
EER (ln)	0.132	-0.183	0.011	-0.042
	(0.113)	(0.086)**	(0.150)	(0.119)
Volatility of EER	0.070	-1.723	0.399	-3.891
	(1.610)	(1.398)	(1.849)	(1.737)**
Ratio of Total Wages to Sales	-0.155	0.056	-0.271	-0.081
	(0.061)**	(0.056)	(0.079)***	(0.060)
Ratio of Investment to Assets	0.130	0.125	0.265	0.208
	(0.075)*	(0.083)	(0.083)***	(0.108)*
Conglomerate	-0.035	-0.006	-0.061	0.007
	(0.032)	(0.022)	(0.038)	(0.026)
N	7041	6098	4353	2886
# of firms	1980	1714	1564	1193

Notes: The marginal effects of the estimated coefficients are reported. * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Table 10 – con't: Estimates of Export Market Participation among Different Financial Conditions

(c) Small Firms

	High Cash Flows Large Debt-to-Asset	High Cash Flows Small Debt-to-Asset	Low Cash Flows Large Debt-to-Asset	Low Cash Flows Small Debt-to-Asset
	(1)	(2)	(3)	(4)
Exporter (t-1)	0.747	0.771	0.773	0.752
	(0.009)***	(0.009)***	(0.016)***	(0.014)***
Cash Flow/Assets	0.145	0.053	0.342	0.351
	(0.132)	(0.082)	(0.616)	(0.511)
Debt-Asset	-0.051	0.124	-0.030	-0.059
	(0.013)***	(0.072)*	(0.020)	(0.117)
Foreign Borrowing / Debt	0.048	0.231	0.223	0.130
	(0.083)	(0.111)**	(0.172)	(0.186)
Assets (ln)	0.073	0.080	0.068	0.067
	(0.009)***	(0.010)***	(0.020)***	(0.018)***
Age (ln)	-0.032	0.007	-0.001	0.017
	(0.009)***	(0.010)	(0.018)	(0.016)
Profitability	0.027	0.000	0.040	0.025
	(0.009)***	(0.014)	(0.013)***	(0.018)
Foreign-Own	0.045	0.151	0.099	0.217
	(0.046)	(0.052)***	(0.117)	(0.090)**
Govt-Own	-0.053	-0.132	-0.125	-0.187
	(0.049)	(0.058)**	(0.100)	(0.196)
EER (ln)	0.249	0.078	0.497	-0.116
	(0.128)*	(0.120)	(0.259)*	(0.210)
Volatility of EER	1.410	-1.418	0.279	-5.069
	(1.793)	(1.831)	(3.186)	(2.868)*
Ratio of Total Wages to Sales	-0.078	-0.115	-0.188	-0.012
	(0.048)	(0.058)**	(0.090)**	(0.082)
Ratio of Investment to Assets	0.126	0.451	0.791	0.303
	(0.119)	(0.129)***	(0.167)***	(0.181)*
Conglomerate	-0.016	0.033	0.100	0.199
	(0.050)	(0.057)	(0.124)	(0.104)*
N	7345	8192	2730	2907
# of firms	2343	2410	1237	1239

Notes: The marginal effects of the estimated coefficients are reported. * significant at 10%; ** significant at 5%; *** significant at 1. The industry dummies are included in the estimation, but their results are not reported. Neither are those of the constant term. Higher values of EER indicate appreciation of the Indian currency against the basket of currencies of trading partners at the industry-level.

Figure 1: Export Intensity (= Exports / Sales)

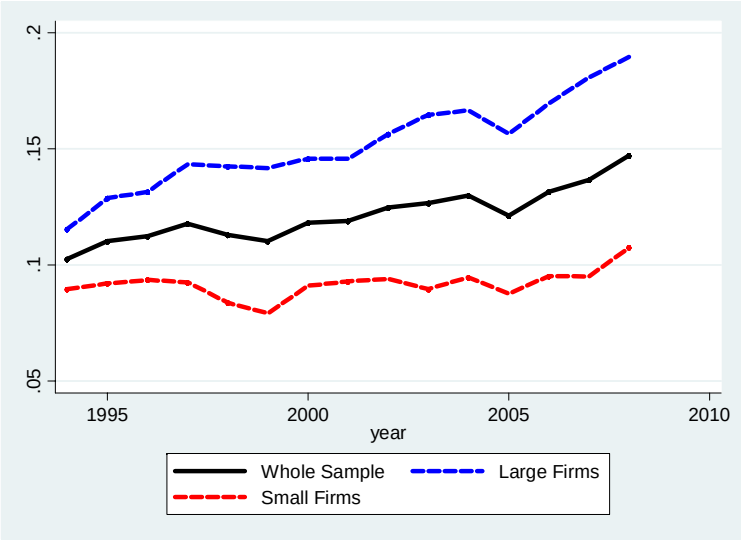

Figure 2: Export Intensity among Industries

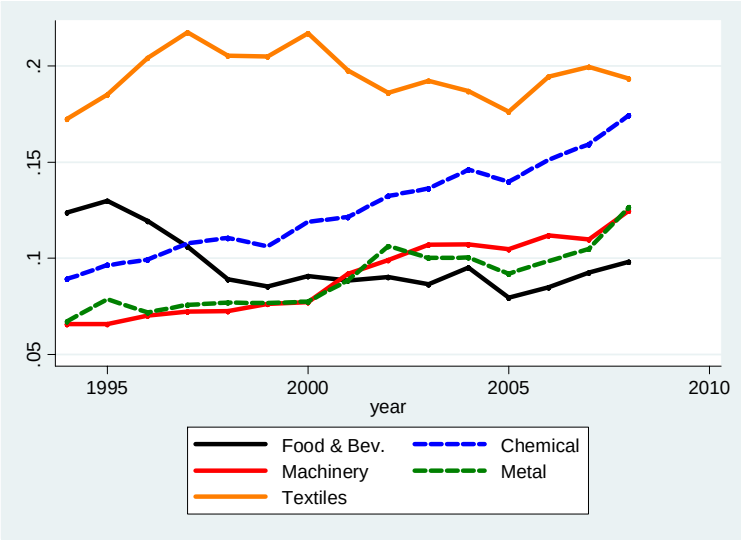

Figure 3: Firm transition rates in export market

(a) Incumbent Exporters (as of *t*)

(b) Non-incumbent Exporters (as of *t*)

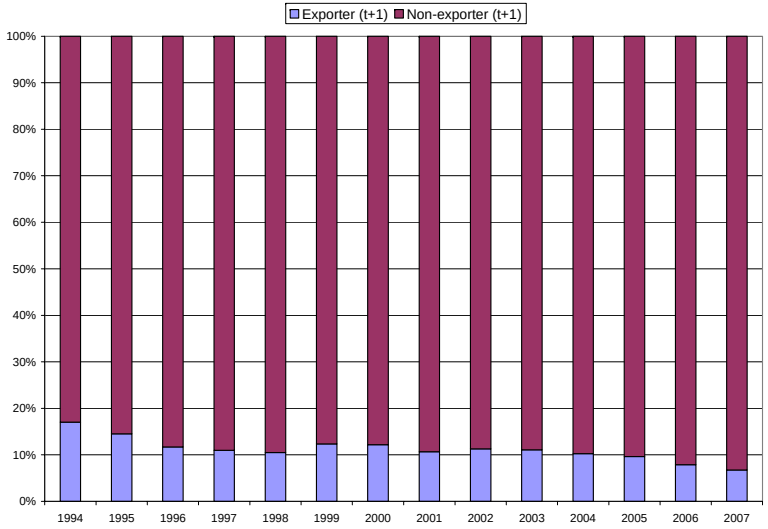

Figure 4: Total Assets – Exporters vs. Non-Exporters

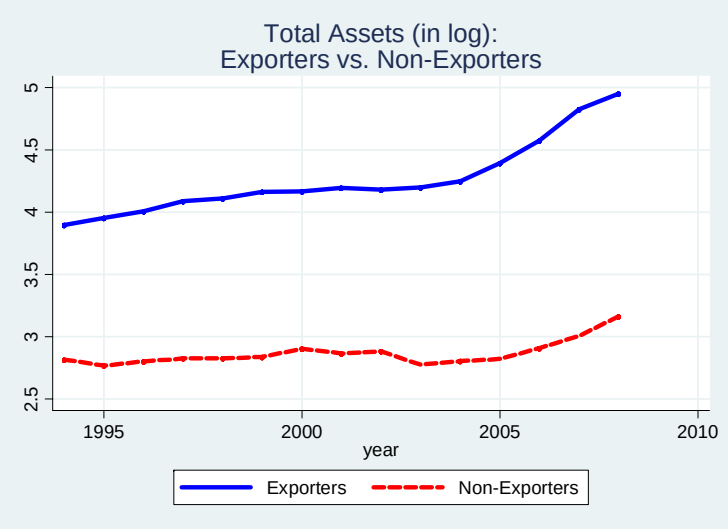

Figure 5: Sales – Exporters vs. Non-Exporters

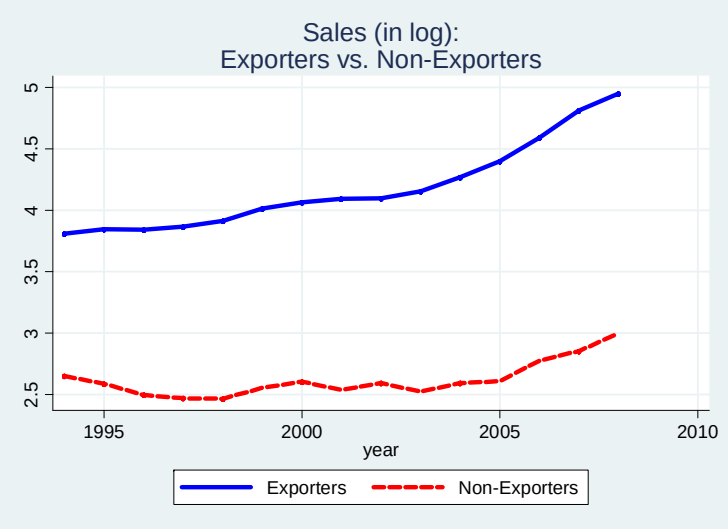

Figure 6: Profitability (PBIT/Assets) – Exporters vs. Non-Exporters

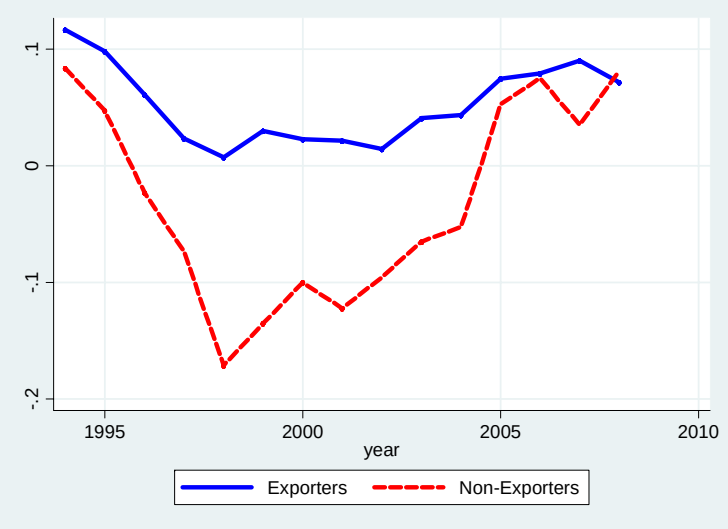

Figure 7: Debt-to-Asset Ratios – Exporters vs. Non-Exporters

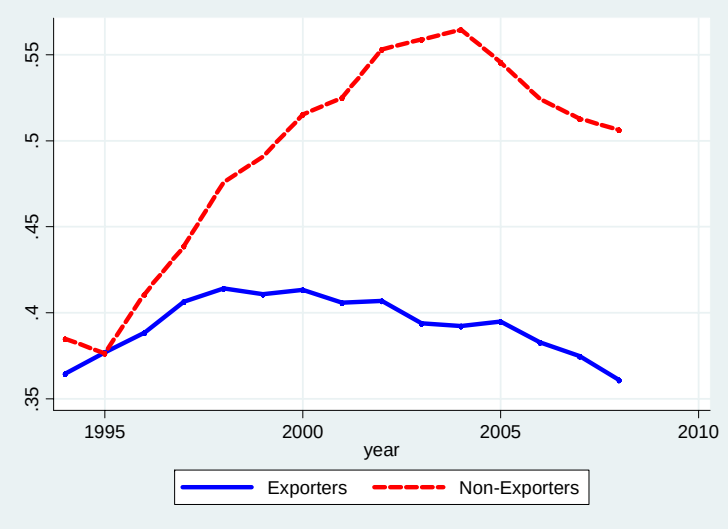

Figure 8: Net Cash Flow / Assets – Exporters vs. Non-Exporters

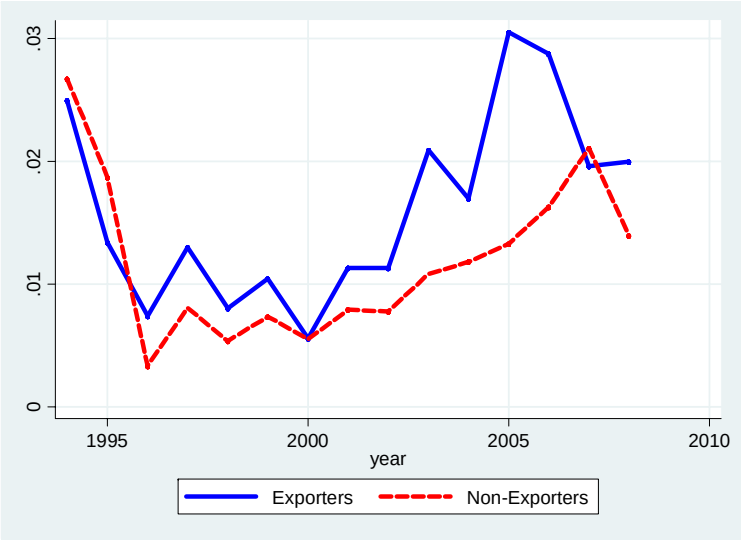

Figure 9: Retained Profits / Assets – Exporters vs. Non-Exporters

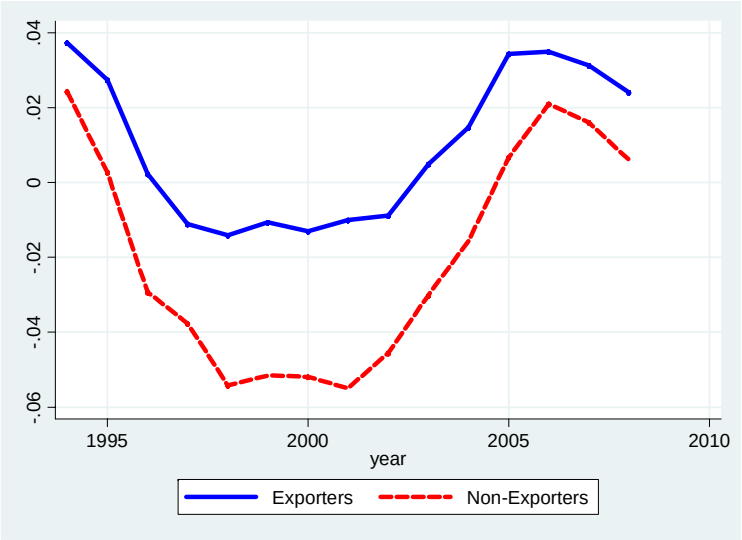

Figure 10: Foreign Borrowing / Debt – Exporters vs. Non-Exporters

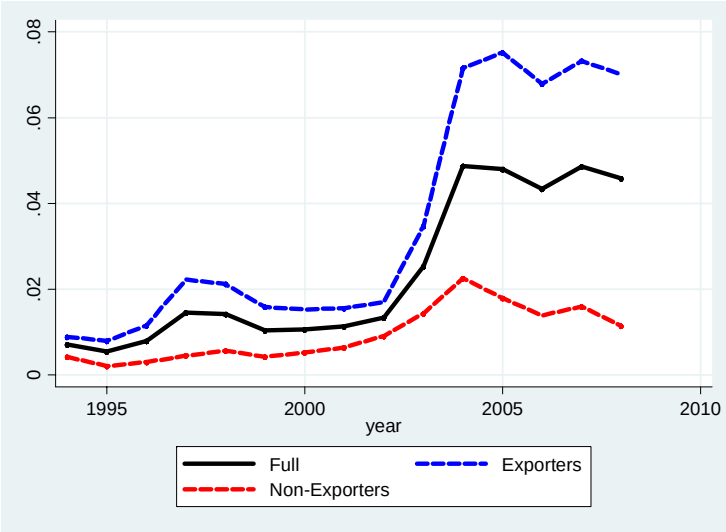

Figure 11: Private Credit Creation as a ratio to GDP