

**CRISES, CREDIT CONSTRAINTS AND INDIA'S EXPORTS:
*An analysis at the firm level***

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Abstract: The prolonged global economic crisis since 2008, with larger spread and intensity, manifested in terms of collapse in output, trade and capital flows. There has been significant shrinking of markets for developing country exports. Availability of trade finance also fell along with a rising cost of trade finance. This paper provides an empirical understanding of the impact of trade credit on India's firm-level exports across sectors during crisis. Dynamic panel data estimation results show that trade finance, among other factors, explains firm-level intensive margins of exports over the cycle. In particular, the significant decline in India's firm-level export intensity during crises is explained by the paucity of trade finance. The results have significant implications for counter-cyclical policies in emerging market economies during crises.

JEL Classification No.: F14, F3, F42, L6

Keywords: Crises, Trade Finance, Intensive Margins of exports

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1. Introduction

This paper provides an empirical understanding of the impact of global economic crises on India's firm-level exports across sectors. The global economic crisis since 2008 got prolonged with larger spread and intensity after a short-lived recovery in 2010. The crisis, which primarily manifested in terms of collapse in activity levels has adversely impacted developing countries including emerging market economies (EMEs) like India. Not only capital inflows to developing countries declined during this period, there has been significant shrinking of markets for developing country exports¹. It is estimated that India's exports declined more than proportionately during the global economic crises on account of weakening global demand (Das et al. 2009).² Independent of declining demand for exports in emerging market economies during crises, evidence from IMF Trade Finance Survey 2008-09 shows that cost of trade finance increased leading to lower availability of trade finance during crisis (Dorsey 2009). India, a middle risk country according to the above Survey, faced declining availability of trade finance.

A large body of literature has emerged linking lower trade volume during crises to trade finance³. Meyn and Kennan (2009) show that the impact on LDC exports was extensive though varying across sectors. Demand played a very vital role. In addition to declining prices and lower demand for some goods, the global financial crisis has also affected developing countries by aggravating the price volatility for some commodities, increasing revenue uncertainty for commodity-dependent countries. Open economies,

¹ EME export growth declined to the tune of 30 per cent during the initial months of the recent crises.

² This is largely on account of high income elasticity of demand for India's exports. For estimates of income elasticity of India's exports across sectors, see Sinha Roy (2009).

³ It is often conjectured that the fall in export demand in recent crises was larger than in earlier such episodes largely on account of a more severe contagion (Sun, 2009).

which are highly trade dependent and export only a small range of products to few markets, are affected most by the trade transmission mechanism.

Liu (2011), however, show that “overshooting effect” on exports during crises cannot be explained by demand or volatility in exchange rates. Because of the adjustment in inventory and overcorrection in demand forecast by every entity of the supply chain when facing an economic crisis, exporting countries, which were at the upstream end of the supply chain, faced a much greater demand oscillation than the demand at the retailer end. A longer supply chain implies larger demand variability and bigger export fluctuations when economic crisis occurs. Chaney (2005) and Manova (2008), by incorporating financial constraints into models of international trade, theoretically argue that imperfect contract enforcement and resulting higher non-payment risk lead to a higher mark-up on external finance and hence exports are constrained by higher cost of external finance. Even though Thomas (2009) show that general credit market conditions, including working capital and long-term investment financing as well as trade finance, have an important impact on international trade, the combination of zero net private capital flows to emerging markets and a domestic banking crisis lowered export volume growth.

Rakshit (2010), in addition to explaining decline in trade and contraction in general in emerging market economies during crises largely in terms of demand and income elasticity of demand and disinvestment in inventories, provides with a supply side view of trade contraction during crises by relating it to credit constraints. The study argues that EME exporters and importers experiencing credit stringency during crises, had considerable contractionary consequences in terms of fall in volume of trade. The

credit-constrained fall in exports led to a decline in domestic production and demand. However, such disruptions in EME trade forming part of the global value chain tended to have a disproportionately large impact on total trade relatively to the cutback in credit or fall in world income. Thus, demand-side explanations to contraction in trade during crises do not deny the role of credit constraints faced by exporters. Athukorala and Kohpaiboon (2009) also view that the drying up of trade credit and traders' overreaction to a possible collapse in demand made the situation even more serious in the crisis since 2008. Further, Brambila-Macias et al. (2011) also show significant impact of trade finance and slowdown of global trade on developing country exports during crises.

Amiti and Weinstein (2011) explain trade collapse during crisis in terms of credit crunch as indicated by the declining health of financial institutions such as banks. Blalock, Gartler and Levine (2007) also held health of financial institutions responsible for export slowdown during crises. Feng and Lin (2013), using country panel regressions further show that worsening financial conditions discourage exports by reducing extensive margins as well as export volumes of individual goods. The study, using a DSGE model, further shows that a credit crunch worsens firm borrowing capability. In such an event, exporters with larger fixed costs in production become more sensitive to financial constraints. Consequently, a credit crunch reduces individual firm exports and discourages potential entrants from entering the export market, which in turn decreases aggregate exports. This is particularly true for small firms in developing countries with restricted access to credit and tightened credit conditions during crisis (Chor and Manova, 2012). In the Indian context, Kapoor, Ranjan and Raychaudhuri (2011) have established a causal link from credit constraints to real outcomes of exporting firms following two exogenous policy changes in India that affected the availability of subsidized credit to

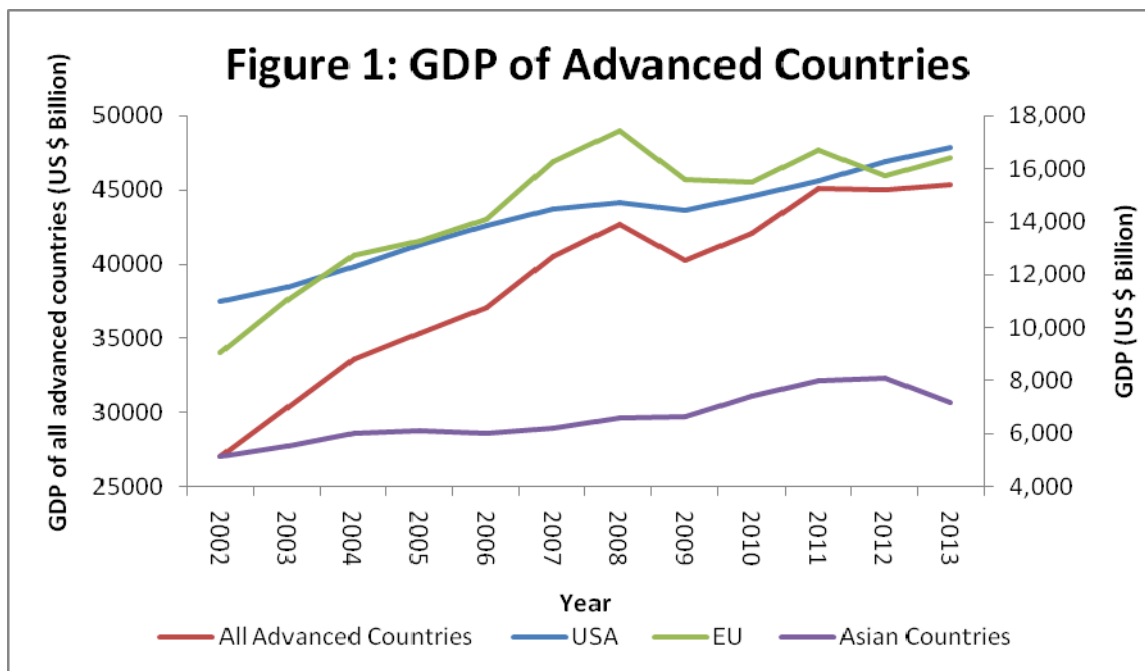
small firms. This study takes into account availability of credit to a firm to impact on its export intensity.

Bricongne et al. (2012) however show that for trade collapse during 2008-09 credit constraints only played an aggravating role only in sectors with high financial dependence. The role of credit was only found to be in addition to demand shock, product characteristics and size of firms. Buono and Formai (2013) also show that Italian exporters are more resilient to short-run drops in the supply of bank credit, but controlling for firm characteristics and demand factors, export flows are found not to be affected by short-run shocks in the credit supply. The available evidence in Asmundson et al. (2011) also show that shocks to trade finance, however, was not the major factor in the decline in trade. The study, using information from surveys of commercial banks by the IMF and others, finds that while bank-intermediated trade finance fell in value during the crisis, it fell by less than merchandise trade. Other explanations thus seem to account for the observed reduction in international trade during crises.

There is no denying the fact that trade finance collapsed during the recent crisis. An explanation to lower export growth in India during this period can find an answer in declining trade finance. In so doing, the following section delineates the extent of decline in India's merchandise exports since 2008 and attempts to build a hypothesis connecting declining trade finance and India's exports. This is not to deny the pervasive influence of demand on exports during crises. The third section puts forth the econometric model to be estimated, the method of estimation and the data used in estimation. The following section presents the results of empirical analysis. The paper thereafter concludes with implications for policy.

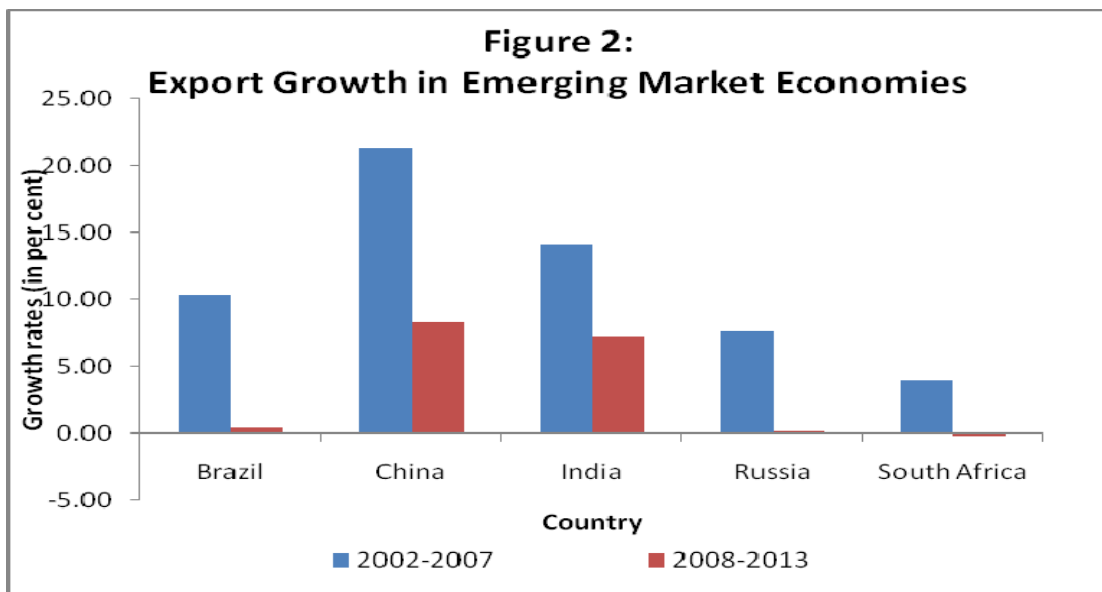
2. Global Crises and India's Export Behaviour since 2008

This section briefly puts forth the dimensions of global economic crises since 2008, but does not provide details of the genesis of crises. India's export growth



slowed down after scaling growth rate of above 28 per cent in 2007-08. In specific, as Figure 1 shows, fluctuating growth was witnessed since October 2008, the fall was sharper when observed against the unprecedented growth of exports at above 48 per cent in the first half of that year. Export growth revived between November 2009 and October 2011 only to decline sharply thereafter. This resulted in lower average export growth at about 14 per cent during 2008-12 as against an average growth of nearly 20 per cent during 2002-2007. Average export growth thus slowed down after 2008, it being more

after 2011⁴. India's monthly exports as shown in Figure 3 remained almost stagnant since April 1991-92. The monthly data also reveal an improvement post April 04-05. The fall in monthly exports is evident during the crisis period. Such a pattern is also evident with regard to export intensities across sectors (see Table 1), except transport equipment exports. The fall in export intensity is found to be more pronounced in case of textiles as compared to other non-traditional manufactures including chemicals and machinery.



⁴ This is not to deny a higher average export growth for India than other emerging market economies since 2008 [see Figure 2].

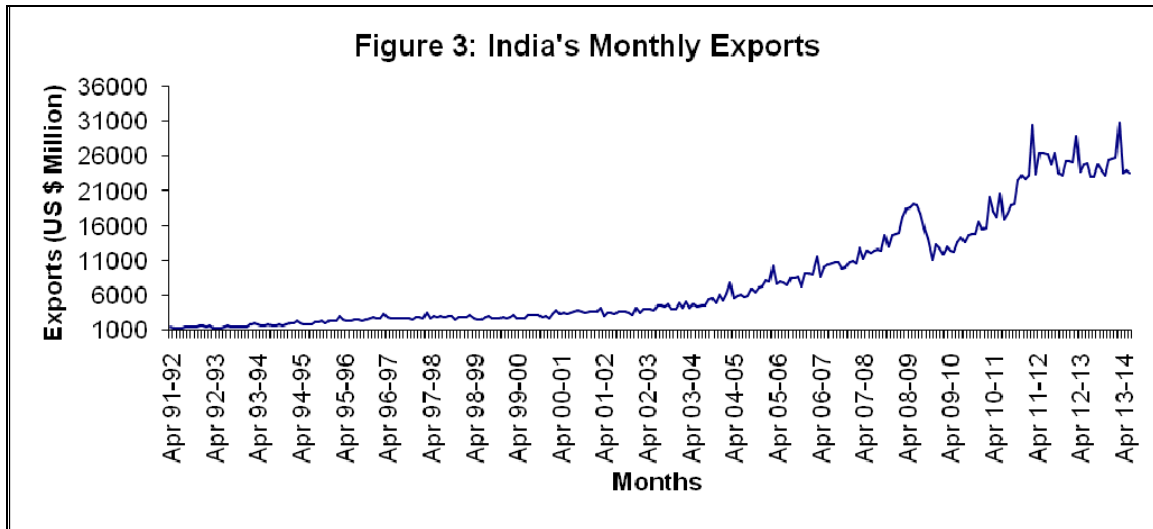


Table 1: Average Export Intensity across Sectors

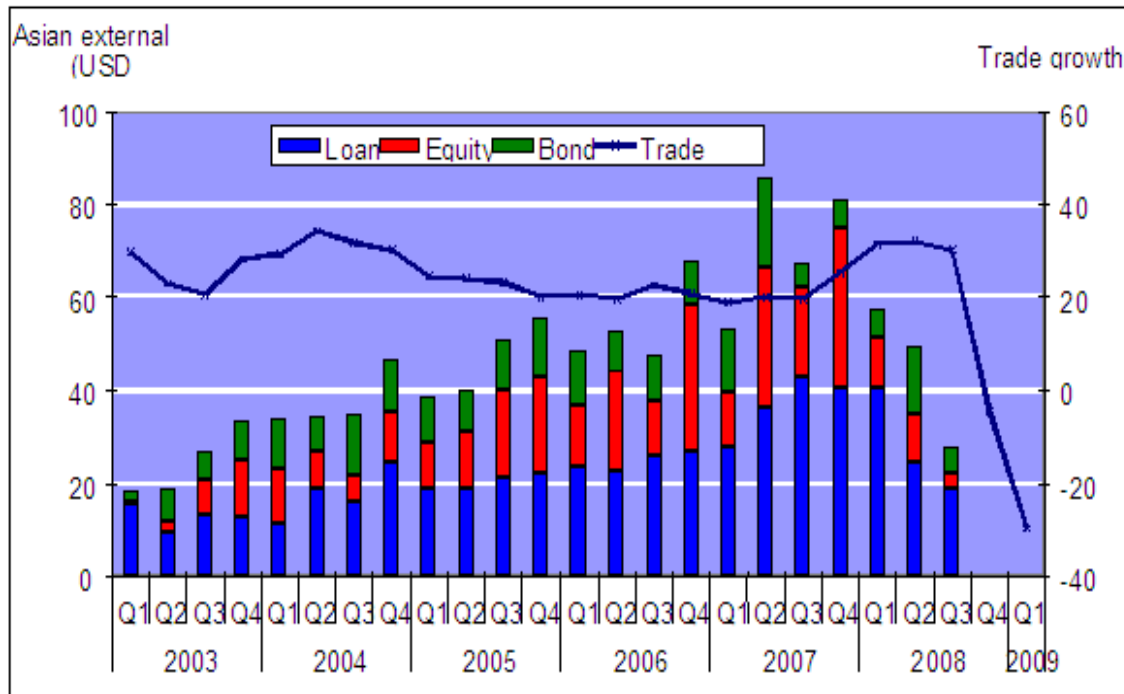
Year	Chemical	Machinery	Transport equipment	Food & Beverages	Textiles
2001	0.10	0.07	0.03	0.05	0.14
2002	0.12	0.07	0.04	0.09	0.17
2003	0.12	0.08	0.03	0.10	0.20
2004	0.13	0.08	0.03	0.07	0.18
2005	0.13	0.09	0.04	0.12	0.19
2006	0.13	0.08	0.04	0.10	0.20
2007	0.12	0.08	0.06	0.08	0.18
2008	0.13	0.10	0.08	0.07	0.21
2009	0.10	0.07	0.05	0.04	0.20
2010	0.09	0.04	0.04	0.21	0.13
2011	0.09	0.04	0.03	0.06	0.09
2012	0.10	0.04	0.04	0.01	0.03
Pre-2008	0.12	0.07	0.03	0.08	0.18
Post-2008	0.10	0.05	0.04	0.07	0.13

Source: Calculated from CMIE, PROWESS database

It is also evident that, during crises, short term trade credit, in particular suppliers' credit upto 180 days also had a fluctuating trend (see Figure 4). While suppliers' credit

more than 180 days took a beating 2008 and 2009, the fall in suppliers' credit upto 180 days showed a declining trend only since 2009. It is evident in the literature that in times of liquidity problems firms being cut out from bank financing cannot find a substitute in the form of trade credit granted by other firms (Love et al. 2007). At the firm level, the fall in average trade credit intensity was evident, in particular for chemicals and machinery (Table 2). All these reflect trade credit constraint faced by Indian firms during crises. The behaviour of India's exports and short term trade credit, thus, will build a case for a possible relationship between the two during the recent economic crises. An econometric estimation is carried out in the following section establishing the link between trade credit and firm-level exports. This possibly nuances the results in Ghosh and Sinha Roy (2015), which finds a significant relationship between credit availability and post-reforms firm-level export performance in India.

Figure 4: Trade Growth and External Finance in Asian Countries



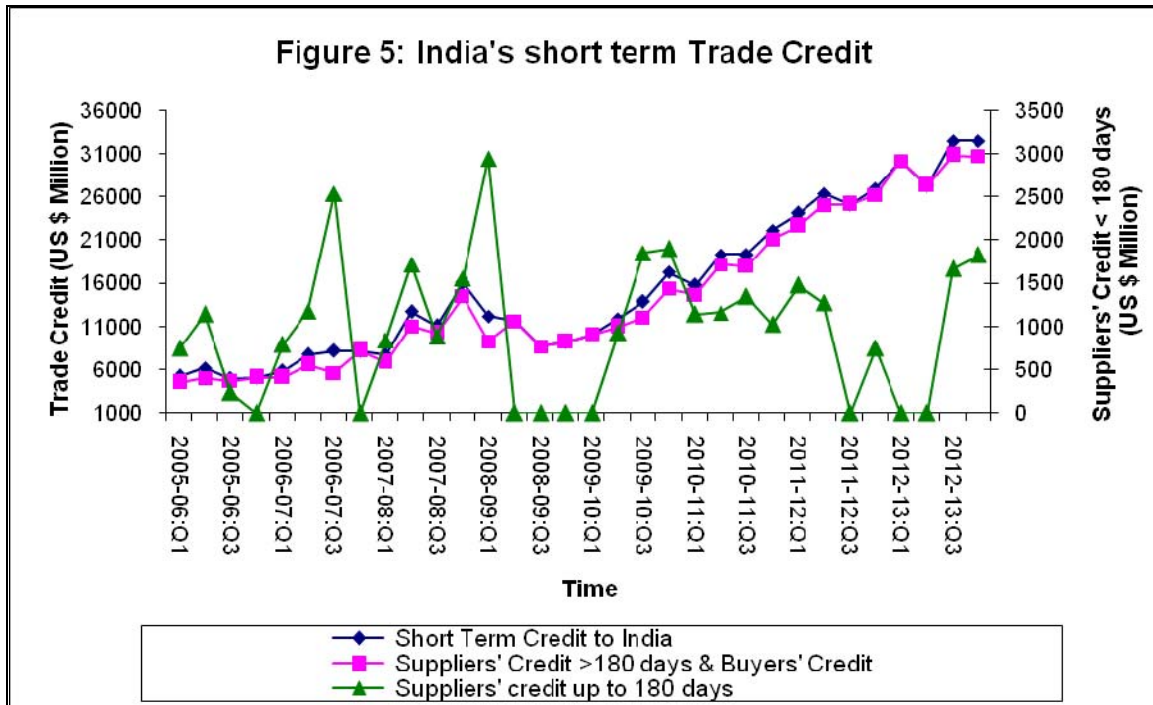


Table 2: Average Trade Credit Intensity during Global Economic Crises

Industry	Pre 2008	Post 2008
Chemical	6.29	0.44
Transport Equipment	0.26	0.31
Machinery	0.71	0.31
Food and Beverages	0.35	0.80
Textiles	4.81	0.24

2. Empirical Model, The Method and Data

Following Aitken et al. (1997) and Ghosh and Sinha Roy (2015), we build the empirical model, where firm-level export intensity depends on trade credit intensity, controlling for other supply side variables including size, age, import of embodied and

disembodied technology, domestic R&D intensity, productivity and marketing cost. In its general form, the model is specified as follows:

$$\begin{aligned}
 Expt_{it} = & \alpha_0 + \alpha_1(size_{it}) + \alpha_2(fortech_{it}) + \alpha_3(sci_{it}) + \alpha_4(age_{it}) + \alpha_5(pdtivity_{it}) \\
 & + \alpha_6(trcrdt_{it}) + u_{it}
 \end{aligned}
 \tag{1}$$

where, $\alpha_i, i=1 \text{ to } 6 > 0$

size: Ratio of firm sales to industry sales.

fortech : Ratio of the sum of expenditure on import of capital good, import of raw materials and import of foreign technical know-how to sales.

sci: the share of sum of advertising expenses, marketing expenses, distribution expenses and R&D expenses to sales of the firm.

age: Absolute age of the firm in number of years.

pdtivity: Ratio of value of output to salaries and wages.

trcrdt: Ratio of short term trade credit to value of output.

rdi: Ratio of R&D expenditure to sales.

The analysis also uses a time dummy which takes the value zero for the pre-crisis period and one for the post-crisis period.

The Method and Data

In our analysis we have used the Dynamic Panel data estimation technique. To estimate time series and cross sectional data in a single equation framework, Panel data estimation technique is widely used in literature. It helps to simultaneously accommodate large volume of data set across time and distinguishes between time-series movement and cross-sectional movement of the data.

For estimation purposes⁵ of the model, dynamic panel data estimation technique has been used. Dynamic effect can be examined in panel data analysis by introducing

⁵ The estimation is done using statistical software STATA 13.

lagged dependent variables in the set of explanatory variables. The model, with one year lagged dependent variable, looks like,

$$Y_{it} = X_{it}' B_1 + Y_{it-1} B_2 + E_{it}$$

where $i = 1, 2, 3, \dots, m$; $t = 1, 2, 3, \dots, T$

$m =$ number of cross-sectional units; $T =$ number of time period

Here the lagged dependent variable, Y_{it-1} captures the entire historical impact of the explanatory variables. The problem however arises at the time of estimation. In the fixed effect and random effect model, the lagged dependent variable is correlated with the disturbance term E_{it} . As a result, the Least Square Dummy Variable (LSDV) method and Feasible Generalised Least Square (FGLS) methods are inappropriate to estimate the model. Dynamic panel data estimation is usually carried out using ‘Generalised Methods of Moments’ (GMM). This is done by estimating the model in first difference to avoid the problem of endogeneity arising due to the presence of lagged endogenous variable in the set of explanatory variables. The main advantage of GMM is that this method does not require any information about the distribution of disturbance term. The problem of correlation between lagged dependent variable and the disturbance term can be removed by taking first difference of the above model, which is as follows,

$$(Y_{it} - Y_{it-1}) = (X_{it} - X_{it-1})' B_1 + (Y_{it-1} - Y_{it-2}) B_2 + (E_{it} - E_{it-1})$$

However the problem of endogeneity continues to exist, since $(Y_{it-1} - Y_{it-2})$ and $(E_{it} - E_{it-1})$ are correlated. Given the long time series data, $(Y_{it-2} - Y_{it-3})$, or Y_{it-2} or Y_{it-3} can be used as the instrumental variables for $(Y_{it-1} - Y_{it-2})$. The other explanatory variables can be the instruments of their own. The GMM IV estimation of Arellano and Bond (1991) is applied to obtain unbiased consistent estimators. A 2-stage iteration method is used to get

Arellano and Bond 2-step estimators. In order to obtain original Arellano and Bond estimates, no correction for the degree of freedom is carried out. In this type of estimation, Sargan test of over-identifying restriction is checked.

Firm-level data are obtained from Prowess Database published by the Centre for Monitoring Indian Economy (CMIE) for the period 2002-2012⁶. The sectors considered for the purpose are food and beverages, textiles, chemicals, machinery and transport equipment industries, which account for about 70 per cent of India's merchandise exports from India. The choice of these industries also gives us the insight about post-reform export performance of low technology industries in comparison to the medium and high technology industries. Statistical information is collected only for exporting firms in this database. A total of 191 observations for the Food & Beverages industry, 414 observations for the textiles and garments industry, 1161 observations for the chemicals industry, 628 observations for the machinery industry and 268 observations for the transport equipments industry are thus obtained. These observations include both domestically owned and foreign owned firms. Data on Sundry debtors outstanding for less than six months has been used as short-term credit of firms. Panel structures for each of the five industries are constructed over a period of eleven years. In what follows is a discussion of the findings from estimations of the econometric model for food and beverages, textile and clothing, chemicals, machinery and transport equipment industries.

3. The Results

The dynamic panel data estimation results of equation (1) showing the determinants of firm-level export performance are presented in Table 3, where the

⁶ The gaps in this database are provided in somewhat detail in Ghosh and SinhaRoy (2015).

relationship between India's merchandise exports and short term trade credit is found controlling various other supply factors. The table shows that exports from Indian manufacturing firms significantly depend on short term trade credit, when imported foreign technology both embodied and disembodied for exporting, sunk costs and the age of the firms are also crucial in explaining the export performance of the Indian firms. It is also found that firm level export performance have a significant path dependence. Sargan test and Arrelano-Bond (2) tests show that the instrumental variables used in dynamic panel data estimation are valid and are not correlated with the error terms in both the specifications. The model estimated is thus identified. The various factors that explain firm-level export performance across industries are as follows.

Short-term trade credit is found to be significantly affecting the export intensity across industry groups. Thus the trade-finance linkage empirically suits well in explaining export contraction during crises. We however do not find presence of non-linearity in the relationship between credit availability and export performance in this sector, as observed in Ghosh and Sinha Roy (2013). It is found that size turns out to be significant in positively impacting on firm-level export performance of textiles, transport equipment and chemicals, while that for food and beverages and machinery have a negative relationship. The relationship across industries is however linear which is not in conformity with the earlier works of Kumar and Siddharthan (1994) for India and Bernard and Wagner (2001) for German manufacturing firms.

Table 3: Estimated Relationship between Trade Credit and India's Exports

	Food and Beverages	Textiles	Chemicals	Transport equipment	Machinery	All Industries
Expi_{t-1}	-.60* (-3.31)	-.09* (-799.30)	.17* (9.23)	.39* (158.29)	.53* (354.86)	.14* (4.98)
Size_t	-69.80* (-4.87)	220.07* (696.18)	.53* (23.97)	.098* (11.12)	-.17* (-24.49)	-.49* (-4.62)
Age_t	-1.59* (-7.72)	-.93* (-191.59)	-.002* (-8.10)	.002* (11.67)	-.008* (-150.39)	.007* (4.44)
Sci_t	.37* (14.14)	1.26* (1335.73)	.051* (2.89)	.19* (6.34)	.66* (75.43)	2.30* (16.84)
Pdtivity_t	.044* (3.34)	-.10* (-192.95)	-.005* (-19.10)	.0001* (17.48)	-.0001* (-49.11)	-.001* (-4.15)
Pdtivity²_t	-.0001* (-11.71)	.0001* (238.74)	.0003* (15.95)	-----	1.16* (51.43)	8.94* (3.83)
Fortech_t	-151.2* (-6.76)	8.50* (533.48)	.027* (10.89)	.022* (4.70)	.08* (122.8)	-.0006* (-2.95)
Fortechsq_t	196.39* (2.31)	-.012* (-552.25)	-.0006* (-11.13)	-.027* (-8.83)	-.038* (-52.25)	.09*** (1.87)
Trade Credit	.12* (3.13)	.19* (744.40)	1.12** (2.44)	.00007* (4.23)	4.35* (71.18)	.0001* (3.84)
(Size*Tradecrdt)_t	305.7* (4.17)	43.86* (95.91)	.59* (18.35)	.43* (9.25)	.34* (36.90)	.32 (0.93)
Time_t	-7.12* (-6.28)	4.59* (180.66)	.006* (4.36)	-0.009 (-1.64)	.02* (138.19)	-.01*** (-1.87)
Sargan test Chi Square	31.23	103.20	98.64	43.04	105.71	14.88
AR (2) Z value	-1.59	0.26	0.65	-1.23	0.58	-0.30
No. of observations	191	414	1161	268	628	2662

Note: 1. z values are provided in parentheses. 2. * denotes 1% level of significance, ** denotes 5% level of significance, *** denotes 10% level of significance.

Based on the perception that exports depend on larger sized firms having access to trade credit, trade credit is interacted with size of the firm. The estimation result shows a significant relationship of this interaction variable with exports across sectors. This is indicative of the fact that smaller sized firms affected by credit constraints in general and

crisis in particular explain decline in firm-level exports. This is in conformity with the findings of Chor and Manova (2012) which suggests that there exists both between and within sector difference in resilience to financial crisis. Typically as smaller firms are more restricted in their access to finance than larger firms, there is a major for concern in exporting in case of smaller firms.

The estimation results further show that age of the firm, measured in terms of number of years in operation since inception plays a significant role in determining firm-level export performance of Indian manufacturing as a whole. This suggests that older firms have acquired the capability to penetrate the world market. However, there are nuances across sectors. Newer firms are found to have significant impact on export performance of food and beverages, textile producing firms, food and beverages, machinery and chemicals. These results are in conformity with the findings of Kumar and Pradhan (2003).

The existing literature shows that firm productivity is one of the major ways to explain firm heterogeneity, which determine export performance. Estimation results show that productivity of firms is significant in explaining the variations in firm-level export intensity in the chemicals, food and beverage, textiles, machinery and transport equipments industries. In transport equipments, the relationship is found to be linear, while it is quadratic for other industries. For machinery, chemicals and textiles, exports are found to increase after a threshold level of productivity. These results do conform to the pattern as shown in the theoretical conjectures by Melitz (2003).

In this study, research and development, advertisement, marketing and distribution cost explain the sunk cost incurred by firms to penetrate in the foreign

market. As expected, sunk cost intensity is found to have a significant impact on exports across sectors. This would imply that advertisement as well as research and development expenditures have a significant bearing on making export internationally competitive. On the other hand, a lowering of these expenditures during crises has led to decline in intensive margins of exports. These results conform to the theoretical conjecture that firms are heterogeneous in terms of sunk costs and the capability of overcoming this sunk cost of entering a foreign market is quite an important factor to explain export intensity.

Import of raw materials capital goods and foreign technology by firms is one of the major sources of acquiring knowledge from rest of the world and in achieving cost competitiveness by using frontier technology and cheaper inputs. Being better in quality than the local available substitutes, imported raw materials and capital goods improve global competitiveness of firms thereby impacting exports positively. Disembodied foreign technology aids the process. It is found that exports across sectors have quadratic relationship with foreign technology.

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4. Summary of findings and Policy Implications

This paper analyses the impact of the global economic crises since 2008 on India's firm-level exports across sectors. The panel data analysis shows that the crises have indeed adversely impacted on firm level exports from India. In particular, trade finance explains firm-level intensive margins of exports over the cycle. In particular, the significant decline in India's firm-level export intensity during crises is explained by the paucity of trade finance. However, the extent to which the factor impacts on trade during crises varies across sectors. The results have significant implications for counter-cyclical

policies in emerging market economies during crises. It will not be too far stretched to say that financing of exports be treated as a priority sector as a counter-cyclical policy measure in situations of a prolonged crises.

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