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Abstract

There exists a glaring gap in the literature studying the role of subnational factors in the export performance of enterprises. A preliminary analysis of the spatial determinants of firms' export activities by Indian states has been undertaken in this study. The size of technological knowledge stock, port facilities and credit availability in a state are observed to be favouring higher export intensity of local firms. All these call for state's policy attention to improve regional knowledge base, strengthening of port facilities or ensuring better transportation networks to ports and improved credit availability if local firms were to face the least hurdles in their efforts to internationalize. Fiscal incentives continue to promote firms' export activities. In addition, firms own characteristics considerably determine their export behaviour.

Keywords : Manufacturing Exports; Regions; India

JEL Codes : F14, P25, N75

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Determinants of Regional Patterns of Manufacturing Exports: Indian Firms since the Mid-1990s

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Keshab Das[**]

1. Introduction

In the extant literature, analytical studies on firm level exporting have conventionally focused on internal explanatory factors related to enterprise-specific capabilities, and external factors like sectoral specificities, domestic and foreign market characteristics, and policy regime including fiscal policy incentives (Zou and Stan, 1998; Lages, 2000; Pradhan and Das, 2013). As firms are conceived as unique bundles of tangible and intangible resources (Barney, 1991; Conner, 1991) covering technological assets, human capital, organizational capital, and social capital, differences in such resources are postulated as important determinants of inter-firm variation in export behaviors. In international trade models with firm level heterogeneity, firms differ in terms of productivity and only firms possessing high productivity are well placed to commit resources required for overcoming the sunk costs in accessing foreign markets (Roberts and Tybout, 1997; Bernard et al., 2003; Melitz, 2003). The global operation of firms is also constrained by industry-specific environments, mainly the sectoral level of competition and technological intensity (Cavusgil and Zou, 1994; Holzmuller and Stottinger, 1996).

While these traditional determinants are important sources of the level, direction and structure of export development from a given country, their explanatory capabilities turn out to be limited over time. The rise of the spatial agglomerations based production, innovation and competitive systems within a country (Mytelka and Farinelli, 2000; Das, 2008), often linked to the global value chains, serves to highlight the missing but vital role of

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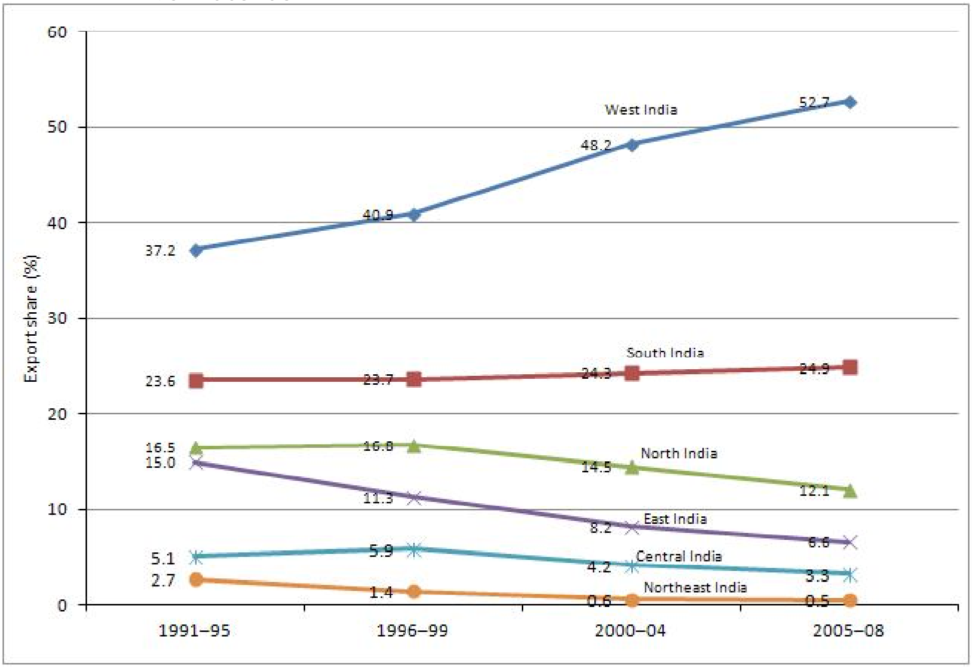
space in which firms operate and undertake exports. As the distribution of exporting firms is getting regionally agglomerated, notwithstanding the presumed easier flows of productive factors among sub-national entities in a country, it is no longer adequate to focus only on firm-specific and/or sector related forces to understand exporting at the firm level (Pradhan and Das, 2013).

Thus, the present study attempts to fill the gap by focusing on issues of firms' exporting at the subnational level. The attention is on the export activities of Indian manufacturing firms. A recent study shows that the proportion of exports originating from a few Indian states increased sharply during the last two decades (Pradhan and Das, 2012). Only a few dominant Indian states from western and southern India remains the engines of Indian exports boom. The combined share of these two regions in India's national manufacturing exports increased from 61 per cent in 1991 95 to 78 per cent in 2005 08 (Figure-1). Therefore, Indian exports are considerably regionally concentrated. This is similar to the spatial patterns of exports observed for other emerging economies like South Africa (Matthee and Naude, 2008) and China (Wu, 2007; Perkins, 1997).

In the case of India, the regional concentration of exports raises a pertinent question: Why are firms from some regions more export-intensive than those from other regions in a given country? To investigate this question, one is required to pay critical focus on the role of space that hitherto occupied a peripheral place in the export literature on India. Taking the case of manufacturing exports by Indian firms at the state levels, the present study seeks to analyze the role of regional factors shaping inter-state differences in firms' export performance.

Figure 1: Regional Distribution of Manufacturing Exports, 1991-95 to 2005-08



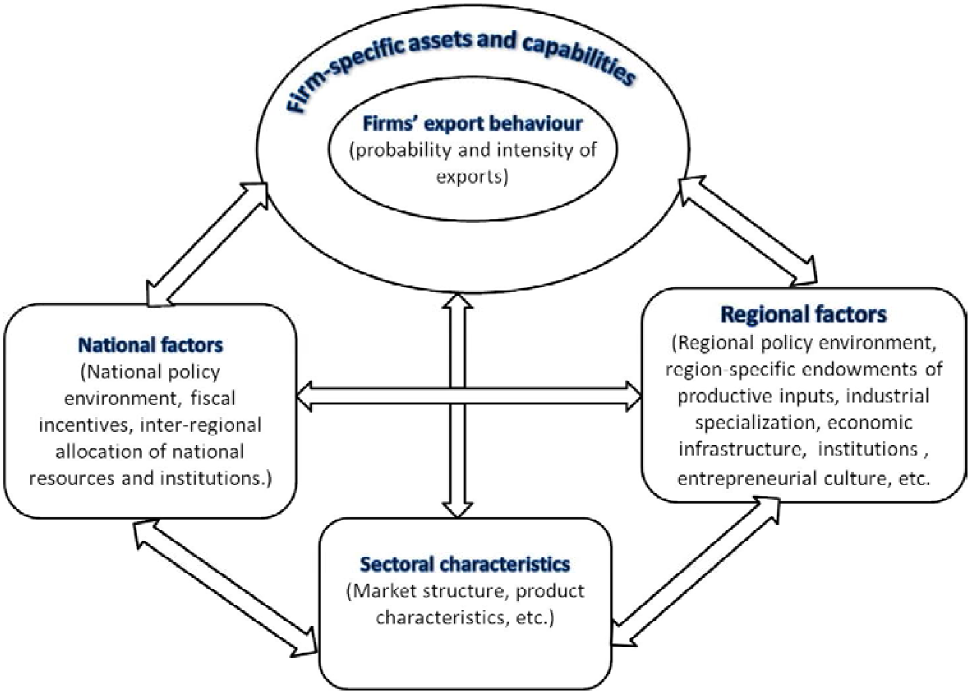
Source: SPIESR-GIDR locational dataset of Prowess manufacturing firms (2010)

The remainder of the study is structured as follows. Section 2 provides the theoretical background linking regional socio-economic and institutional characteristics to the spatial distribution of national exports at the firm-level. Section 3 develops the empirical framework used in the study. While Section 4 discusses method of estimation and data sources, Section 5 presents empirical findings and inferences drawn on them. Section 4 concludes with the summary of key messages obtained.

2. Why Do Regions Matter in Exports?

The existence of firms in a region those are more successful in exporting than firms based in another region within a given country indicates that the location may have a decisive influence on firms' export behaviour. Exporting capability of firms may, therefore, be viewed as the outcome of an interactive process between firms, industry and regional resource bases, rather than an independent decision taken by the firm alone. Figure-2 proposes that the interaction between firms and host regions that may shape the firm level exporting can be viewed to be characterized by a set of important regional specificities like factor conditions, demand situations, technological specialisation of economic activities, economic infrastructure, technological institutions and local policy environment concerned with internationalization.

Figure 2: A General Conceptual Framework Linking Regions and Firms' Exports



Source: Authors' Construction.

Theoretical literature in the form of neo-technology theories of international trade (Posner, 1961; Vernon, 1966), stage theory of internationalization (Johanson and Wiedersheim-Paul, 1975; Newbould, Buckley and Thurwell, 1978; Buckley, 1989; Johanson and Vahlne, 1977, 1990, 2006), and resource-based theory of the firm (Penrose, 1959; Barney, 1991; Conner, 1991) tend to emphasize the key role which firm-specific technological and non-technological (i.e. physical, human, and social) resources play in the origin of exports and foreign investments at the firm-level. But how are these firm-specific capabilities, the critical factor for the origin of exports, themselves get determined? Are they just a function of firms' innovative efforts alone?

The evolutionary and systemic approach to the study of technology development stressed that the firms' innovative performance is a result of a complex set of interactions and relationships involving firms and non-firm agents such as universities, private and public research institutions, innovation-supporting organizations (Nelson and Winter, 1982; Lundvall,1992; Nelson,1995; Dosi,1997; Levinthal, 1998). These interactions and relations can be seen to be localised and a locally embedded process as regional scale, resources and institutional context are critical in shaping and sustaining the innovation capability of firms and regions (Storper, 1997; Cooke, Uranga and Etxebarria, 1997; Doloreux, 2002; Doloreux and Parto, 2004; Asheim and Gertler, 2005; Pérez, Vang and Chaminade, 2009).

In the literature on Regional Innovation System (RIS), a region is viewed as a spatially bounded collection of innovative firms and other actors like universities, research institutions, scientists, entrepreneurs, consumers and local government agencies that characterise a specific knowledge base. Thus, regions are the levels at which firms innovate being a part of an interactive system involving regional networks of innovating firms, local clusters and research institutions (Lundvall and Borrás, 1997). Moreover, regions vary greatly in terms of knowledge base and technological opportunities vital for firms' R&D performance. Therefore, regions are the levels to understand the formation of firms' competitive capabilities which ultimately shape their transnationalization efforts like exporting or outward FDI.

Porter (1998) too emphasized that competitive advantage resides in the locations in which firms are embedded. Thus, spatial differences in Porter's Diamond conditions of competitive advantages like factor conditions, demand characteristics, presence of related and supporting industries, and competitive rivalry of the firms, may explain why firms from certain regions are more dynamic, innovative and export-oriented than those from other regions.

As visualised in the context of the so-called new economic geography, firms have greater incentive to locate in regions offering large market because of the saving on transport cost and greater scope for forward and backward linkages (Krugman, 1991a; Fujita and Krugman, 2004). The concentration of the upstream and downstream producers in a region may result in increasing returns to production and the availability of more varieties of differentiated goods, which in turn may attract even more number of productive factors and consumers into the region. Location matter as agglomeration of production and demand takes place along the interaction between trade costs, increasing returns and consumer preference for diversity in consumption. The new trade theory would suggests that exports will be more profitable from regions that possess large markets because the motivations for concentration of production are essentially to minimize transport costs and to exploit returns to scale (Krugman, 1991b; Fujita, Krugman and Venables, 1999). This led to the hypothesis that regions with large markets are likely to be more export contributing in a country than other regions with smaller market size.

The above theoretical insights indicate that regions persuade the levels and direction of firm-specific capability formation and concentration of production backed by economies of scale so as to determine firms' outward orientation. As there is substantial regional heterogeneity in firm-specific competitive strategies like R&D and domestic market size, those differences are natural to be reflected in the regional export profiles within a given country. Thus, it can be hypothesized that firms' export activities depend on, among other factors as summarized in Figure-2, local market condition, endowment of factor inputs, and policy environment of different regions within a country.

Following region-specific factors are considered to be potentially important for explaining inter-firm variation in export activities:

2.1. Market-related Factors

Inter-regional differences in the size, growth and nature of demand can be argued to be a major set of factors underlying regional disparities in the firm-level export performance. Regions with large and robust demand, as per the new economic geography theory (Krugman, 1991a; Amiti, 1998), are the preferred location for manufacturing firms seeking minimization of transport costs. The concentration of production (i.e., firms) in a larger region in turn provides increasing returns and a dynamic environment for interactive learning and innovation shaped by inter-firm interactions based on competition, synergies and complementarities. These translate into cost and quality competitiveness of firms that may positively influence their decision to exports. Moreover, developed and highly growing states are likely to have the advantage of scale, business-friendly investment climeate and better quality of government support services for undertaking export activities. While the regional gross state domestic product *(GSDP)* is taken as a proxy for the absolute size of the regional market in the present study, regional per capita GSDP *(PGSDP)* has been used for representing the sophistication of regional demand for more product varieties.

2.2. Input-related Factors

The second set of factors contributing to the regional disparities in exports could be related to the asymmetric evolution of internal supply capacity among regions (Redding and Venables, 2004). The size and the growth of the supply capacity of a region depend critically on the factors affecting cost of production and internal transport costs (Fugazza, 2004). In addition to inter-regional differences in local technological capabilities, regions may differ in terms of adequate availability of physical infrastructure covering transport (i.e., roads, railways, and ports), energy, and telecommunications. Regional disparity may also manifest in terms of technological structure of industrial specialization.

2.2.1. Regional Technological Capabilities

The theory of 'technology gap' on international trade emphasize that innovative countries will be leaders in international markets as there is a time lags in technology transfer/diffusion from innovating countries to non-innovating countries (Posner, 1961; Soete, 1981; Dosi and Soete, 1988). To certain extent, this may also be true at the sub-national levels when a few regions within a country lead export success of the nation. The analytical frameworks of Industrial Districts (Markusen, 1996; Sforzi, 2002; Becattini et al., 2003), Innovative Milieu (Camagni, 1995; Maillat, 1998), and Learning Region (Rutten and Boekema, 2007) consider regions as territorially defined productive systems nurturing a cumulative process of endogenous resource creation, accumulation, diffusion and transfer. The greater the local resource base of a region in terms of the stock of knowledge and information, local enterprises are more likely to gain competitive advantages for export expansion.

Therefore, regions within a given country would enjoy competitive and trade advantages if they are sources of continuous development of new products or improvement in product quality or introduction of new production techniques with lower cost. These states are likely to have abundance of critical firm-specific intangible assets required for participating and succeeding in international markets. Results from a number of cross-national studies suggests that countries investing more in R&D or taking more US patents (measures of technological capabilities) have been more successful in enhancing market share in global market (e.g., Soete, 1981; Fagerberg, 1988; Amendola, Dosi and Papagni, 1993; Amable and Verspagen, 1995; Verspagen and Wakelin, 1997; Loannidis and Schreyer, 1997).

The present study has used the cumulative patent applications originating at the levels of Indian states to proxy regions' stock of technological knowledge. Thus, states with greater the stock of patent applications are predicted to have higher export orientation of their manufacturing firms.

2.2.2. Availability of Technical Manpower

A growing body of firm-level literature suggests that exporting firms pay higher average wages than non-exporting firms as the former uses more educated labour than the latter category of firms (e.g., Bernard and Jensen, 1995; Schank, Schnabel and Wagner, 2007). It is argued that exporting firms rely on the use of skilled workers to differentiate their products in order to beat intense competition in international markets (Munch and Skaksen, 2008). With skill and technology intensities becoming critical forces in world manufacturing exports (Lall, 2000), regions with rich endowment of low-cost skilled and technical manpower can be expected to be the home of dynamic firms that chooses to compete globally. A region with poor human capital base, on the contrary, may be an export laggard as its firms are deprived of access to required endowment of skills.

2.2.3. Availability of Physical Infrastructure

Adequate availability and quality of physical infrastructure like reliable supply of power, extensive and effective transportation system (roads, trains, waterways, and airways), and excellent telecommunication networks (telephone, internet, etc.) make it easier for firms to perform well in global markets. A number of studies have confirmed the trade-determining role of physical infrastructure (WTO, 2004; Fugazza, 2004; Francois and Manchin, 2007). While high export performance of Asian economies has been ascribed to an improved infrastructure triggering a reduction in trade costs (Brooks and Hummels, 2009), poor export performance of African countries has been attributed to bottlenecks in their infrastructure (Mbekeani, 2010; Freund and Rocha, 2010). Inadequate and inefficient infrastructure and related services tend to inflate both the transportation costs and production costs and adversely affect the reliability, flexibility and timely delivery of the supply process. Therefore, states with poor infrastructure in terms of supply of power, road links, ports and telecommunications are likely to dampen the local entrepreneurial talent and increased significantly the cost of doing business and are unlikely to be productive enough to undertake large scale internationalization activities.

2.2.4. Finance

The export success of regions may also be shaped by how well they have developed financial institutions that ensures firms' access to industrial and trade finance and products for insurance. In most of the emerging economies, inadequate access to finance has been the single most important constraint on firm growth and internationalization (Morris, et al., 2001; Mbekeani, 2007; Pradhan and Sahu, 2008). As regions greatly vary in terms of sufficient availability of finance to firms, inter-regional differences in building financial institutions and supply of credit could be another important factor explaining regional differences in firms' export behaviour.

2.2.5. Regional Distribution of FDI

Spatial distribution of FDI inflows may influence the regional profile of firms' export-orientation. The supply capacities of host economies/regions get expanded when FDI transfers tangible and intangible resources and its affiliated firms get access to the two-thirds of world export markets controlled by TNCs (UNCTAD, 1999). For many technology-intensive products, TNC affiliation is crucial for firms from developing countries to break into export markets because a large part of these markets is internal to their international production systems (UNCTAD, 2002). The presence of foreign firms can force its domestic counterparts to learn and implement technological and skill up-gradation to compete. In such a scenario, regions hosting relatively large amount of foreign investments can be expected to have higher export performance than another region not attractive to foreign firms. Sun (2001) found that the FDI played a strongly positive role in the export performance of Chinese provinces in the coastal and central regions while it has an insignificant role for the western region.

2.2.6. Spatial Agglomerations

The tendency of factor inputs and economic activities to get spatially concentrated in clusters has been confirmed by a voluminous empirical literature (for India, see, Das, 2005). Regions with higher degree of spatial agglomeration of productive units may do well in innovation and exporting because of localized knowledge flows and spillovers, labor market pooling, input sharing, and demand proximity (Muro and Katz, 2010). Koenig (2009) reported that the decision to exports by non-exporting firms positively depend on their spatial proximity to the pool of exporters in a region.

Within the overall trends of spatial agglomeration of firms, urban centres/ cities have become an important source of global competitiveness. Urban centres are found to be more innovative and productive than smaller ones (Simmie et al., 2002; Acs et al., 2002; Lim, 2003; Bettencourt, Lobo and Strumsky, 2007; Rothwell, 2012). Cities are becoming increasingly intelligent as they develop innovation environments based on spatial proximity, learning institutions, and physical-digital innovation ecosystems (Komninos, 2002). They offers a number of advantages to individuals and firms namely, proximity, density, variety and access to urban assets that allow conducive environment for innovation (Athey et. al., 2007). Hence, greater number of urbanized areas in a state can be predicted to lead to a higher enterprise focus on export-oriented production in the concerned state.

2.2.7. Sectoral Specialization

A region's industrial specialization patterns might have impact on its export performance since industries have different growth opportunities in international markets and asymmetric propensities for technological change and scope for knowledge spillovers (Pradhan and Das, 2013). Regions specializing on dynamic industrial structure by shifting more to technology-driven sectors are likely to have greater involvement in global markets than states that are continued to be industrializing around traditional low technology sectors.

3. Formulation of Empirical Framework

Having discussed theoretical rationale for sub-national factors to play a role in export performance, we next proceed to formulate a suitable analytical model for empirical verification. The empirical framework as specified below has been chosen for explaining inter-firm patterns of export intensity in the present study:

$$\begin{aligned} FEX_{it} = {} & \beta_0 + \beta_1 AGE_{it} + \beta_2 SIZE_{it} + \beta_3 SIZE^2_{it} + \beta_4 RDIN_{it} + \beta_5 ETP1_{it} + \beta_6 ETP2_{it} + \beta_7 ADV_{it} + \beta_8 AFF_i + \beta_9 BGA_i \\ & + \beta_{10} HI_{jt} + \beta_{11} RDS_{jt} + \beta_{12} FSB_{it} + \beta_{13} SDP_{kt} + \beta_{14} SDPG_{kt} + \beta_{15} PSDP_{kt} + \beta_{16} STKS_{kt} + \beta_{17} SPWR_{kt} + \beta_{18} STRP_{kt} \\ & + \beta_{19} SPRT_k + \beta_{20} STI_{kt} + \beta_{21} SFN_{kt} + \beta_{22} SFDI_{kt} + \beta_{23} SPL_{kt} + \beta_{24} SC_{kt} + \beta_{25} TWN_{kt} + \varepsilon_{it} \qquad \text{.......... ...}(A) \end{aligned}$$

Where explanatory variables are as measured in Table-1 and εit is the random error term.

Table 1: Description and Measurement of Variables

Variables	Symbols	Measurements
Dependent Variable		
Firm Export Intensity	FEX_{it}	Goods and services exports of *i*th manufacturing firm as a percent of sales in the year t.
Independent variables		
Firm-specific variables		
Firm Age	AGE_{it}	Natural log of the age of *i*th firm in number of years from the year of its incorporation.
Firm Size	$SIZE_{it}$	Natural log of total sales (Rs. Million) of *i*th firm in *t*th year.
Firm Size Squared	$SIZE^2_{it}$	Squared of the natural log of total sales (Rs. Million) of *i*th firm in *t*th year.
R&D Intensity	$RDIN_{it}$	R&D expenditure (capital + current) as a percent of total sales of *i*th firm in *t*th year.
External Technology Purchase	$ETP1_{it}$	Expenses in royalties, technical and other professional fees paid abroad by *i*th firm as a percent of sales in the year t.
	$ETP2_{it}$	Expenses on imports of capital goods and equipment by *i*th firm as a percent of sales in *t*th year.
Product Differentiation	ADV_{it}	Advertising and marketing expenses of *i*th firm as a percent of sales in the year t.
Affiliation to Foreign Firm	AFF_i	Assume 1 if *i*th firm has affiliation to a foreign firm, 0 otherwise.
Business Group Affiliation	BGA_i	Assume 1 if *i*th firm has affiliation to a domestic business group, 0 otherwise.

Variables	Symbols	Measurements
Industry-specific variables		
Sectoral R&D intensity	RDS_{jt}	R&D expenses (capital + current) of *j*th industry as a percent of industry sales in *t*th year.
Sectoral concentration	HI_{jt}	Natural log of Herfindahl Index of *j*th industry in *t*th year based on domestic sales.
Policy variable		
Fiscal benefits	FSB_{it}	Total fiscal benefits related to exports activities received by *i*th firm as a percent of sales in the year t.
Region-specific variables		
Demand-related factors		
State Domestic Product (net)	SDP_{kt}	Natural log of gross state domestic product (constant 1999 00 Indian Rs.) of *k*th Indian state in year t.
Growth of SDP	$SDPG_{kt}$	Annual percentage change in SDP (constant 1999 00 Indian Rs.) of *k*th Indian state in year t.
Per capita SDP	$PSDP_{kt}$	Natural log of per capita SDP (constant 1999 00 Indian Rs.) of *k*th Indian state in year t.
Inputs-related factors		
State Skills Availability	SKL_{kt}	Natural log of higher education enrolments in *k*th Indian state for *t*th year.
State Power Availability	$SPWR_{kt}$	Power generated (kWh) per 100000 population of *k*th Indian state for *t*th year.
State Land Transport Infrastructure	$STRP_{kt}$	Total road and railway line length (km) per 100 square km area of *k*th Indian state for *t*th year.
State Port Infrastructure	$SPRT_{k}$	Dummy variable taking value 1 if *k*th Indian state possesses port facilities, 0 otherwise.
State Telecom Infrastructure	STI_{kt}	Telephones per 100 population in *k*th Indian state for *t*th year.
State Finance Availability	SFN_{kt}	Credit advances by Scheduled Commercial Banks (Rs. Crore) per 100000 population of *k*th Indian state for *t*th year.

Variables	Symbols	Measurements
Regional Technology-related factors		
State Technological Knowledge Stock	$STKS_{kt}$	No. of cumulative patent applications from *k*th Indian state since 1989 1990 per Rs. 1000 billion of its' real gross SDP in year t.
State's Technological Specialization in Manufacturing Sector	SPL_{kt}	Net Value Added (NVA) of high technology manufacturing sectors as a percent of NVA of total manufacturing sector of *k*th Indian state in year t.
FDI-related factor		
State Inward FDI	$SFDI_{kt}$	Cumulative FDI inflows since 1982 83 into *k*th Indian state as a percent of its gross SDP in year t.
Agglomeration-related factor		
Spatial Concentration of Firms	SC_{kt}	No. of manufacturing factories per 1000 sq KM of area of *k*th Indian state in year t.
Towns	TWN_{kt}	Natural log of number of towns possessed by *k*th Indian state in year t.

Note: High-technology manufacturing sectors include chemicals, pharmaceuticals, electrical & optical equipment, machinery & equipment and transport equipment.

The export intensity function summed up in the equation A is clearly aimed at analyzing variations in the export intensity of manufacturing firms based on a multidimensional framework that incorporate a firm dimension and aspects related to sector, policy and state. As exporting occurs at the level of a firm, it is useful to formulate a standard firm-level framework that integrates firm-specific variables with region- and sector-specific factors for analysing export behaviour.

Among firm-level determinants, firm size (*SIZE*) has been found to be relevant for export performance of enterprises (Bonaccorsi, 1992; Calof, 1994; Roberts and Tybout, 1997; Bernard and Jensen, 1999; Bernard and Wagner, 2001). Large size reflects the larger resource base of a firm that enables it to enjoy preferential advantages in the product and inputs markets and to have greater ability in undertaking risk and uncertainty arising from foreign operation. However, *SIZE* may show positive effect up to a certain range as growing very large pushes firms into competence traps. It is when firms' core capabilities become core rigidities as they start losing pro-activeness and flexibilities that were their competitive strength during the stage of moderate size (Sterlacchini, 2001; Pradhan, 2008). Thus, *SIZE* is expected to have a positive influence on exports, while it's squared term $SIZE^2$ is postulated to have a negative coefficient. In the learning models of industrial and firm dynamics (Ericson and Pakes, 1995; Jovanovic, 1982), the age of firm (*AGE*) captures the effect of firm's accumulated learning and information over the past and, thus, is expected to affect positively firm's export behaviour.

Firms' innovative capabilities in acquiring, assimilating, modifying and creating technology have evidently played a crucial role in the export competitiveness (Braunerhjelm, 1996; Wakelin, 1998; Bleaney and Wakelin, 1999; Lefebvre and Lefebvre, 2002; Yang, Chen and Chuang, 2004; Fernandez and Nieto, 2005; Singh, 2006; Anh et al., 2007). In the present study, three measures of technological activities have been employed: (i) *RDIN* is the in-house R&D expenses of the firm as a percentage of sales, (ii) *ETP1* is the technological payments made abroad by the firm as a percentage of sales, and (iii) *ETP2* is imports of capital goods as a percentage of sales. While *RDIN* measures firm's indigenous technological efforts, *ETP1* and *ETP2* represents acquisition of foreign technology in disembodied and embodied forms respectively. Keeping other factors constant, *RDIN* and *ETP2* are expected to help the firm achieve higher export activities. However, *ETP1* may have an ambiguous effect as technology contracts to developing countries like India come with export prohibition clauses. These clauses directly restrict the sale of manufactures produced using the imported technology to the technology importing country alone and their other conditionality like 'no reverse engineering' inhibits effective technology transfers to technology importing firms (UNCTC, 1984).

As there are higher marketing entry barriers in many segments of international market, advertising-intensive firms may perform well in exporting than firms with negligible advertising expenses. Marketing skills and knowledge are often relatively scarce resources in developing countries to impede their manufacturing exports (de la Torre, 1971). Marketing and advertising expenses (*ADV*) creates a unique and superior image of a firm's product in the minds of the buyers and may serve as a key source of its overall completive strength in the world market (Pradhan, 2008).

Firms' affiliation to foreign companies (*AFF*) and domestic business groups (*BGA*) are other two important firm level variables included in the study. Rampant market failures and asymmetric access to information in emerging economies (Guillén, 2000; Khanna and Palepu, 2000) make the affiliation of a firm to a business group a very crucial element in enhancing its competitive capability. This affiliation ensures firm's access to group infrastructure and reduction in transaction cost through intra-group sharing of information, inputs, skills, technologies, etc. This in turn may encourage internationalization of business group affiliated firms. Standalone or non-group firms, on the contrary, faces greater uncertainty in overseas expansion due to absence of facilitating institutions, information and infrastructure in emerging economies. Similarly, a firm's ownership links to multinational enterprises (MNE) may encourage greater export involvement as the affiliated firm get access to capital, technology, information, distribution channels and marketing skills of the MNEs and the global market controlled by them (de La Torre, 1971). MNE affiliation could be more important for export-oriented production in technology-intensive and dynamic products in world markets (UNCTAD, 2002).

Firms export behaviour may further be influenced by inter-industry differences in technological opportunities and domestic market structure. Firms operating in sectors with higher technological opportunities measured by sector-level R&D intensity (*RDS*) are likely to benefit from higher knowledge intensity of other firms in the same sector for product quality improvement and efficiency that may encourage their participation in foreign markets (Barrios, Gorg and Strobl, 2003). Further, technology intensive products are the fastest growing category in the world trade (Lall, 2000) so firms producing such products may exhibit higher scope for export success.

The relationship between the level of industry concentration (*HI*) and firms export performance is apparently ambiguous. In one situation the strong market power of firms in a highly concentrated industry might provide more incentive to concentrate on domestic market, in another situation the dominant firms that possess strong intangible and tangible assets might be inspired to look beyond domestic markets (Wu, Fu and Tang, 2010).

Government policies in various forms like export credit, tax holiday on export income, duty drawbacks, export insurance programs, etc., can have influence on export performance (Fitzgerald and Monson, 1989; Roy, 1993; Pradhan and Sahu, 2008). In India, exporting has been granted incentives through various schemes involving concessional import duty on capital goods imports, duty free imports of inputs, and reimbursement of customs and central excise duties paid on imported inputs. Beside, firms operating in the Special Economic Zones (SEZs) are eligible for income tax exemption for a specified period. These fiscal benefits (*FSB*) release additional financial capital complementing a firm's resources and can reduce the effective costs of its internationalization.

4. Data Sources and Method of Estimation

The empirical analysis of Model A has been accomplished with the help of a multi-dimensional dataset, the SPIESR-GIDR Locational Dataset on Indian Manufacturing Firms (SG-LoDIMF), built for the Indian Council of Social Sciences (ICSSR) sponsored research project entitled, *Exploring Regional Patterns of Internationalization of Indian Firms: Learnings for Policy*. The database has been created by collecting information on firm-level financial and non-financial variables on an annual basis since 1991, socio-economic characteristics of host states, and fiscal incentives for exporting. While firm-specific indicators are derived mainly from the Prowess Database of the Centre for Monitoring Indian Economy (CMIE), identification of firm's host state has been accomplished based on plant location information obtained from both the Prowess and intensive internet searches of company websites, annual reports, consultancy reports, etc.

A total of 8486 Indian manufacturing firms were allocated into respective host state and union territory in the SG-LoDIMF database and they together are estimated to have accounted for about 58 percent of national manufacturing exports during 1991%2008 (Pradhan and Das, 2012). Sectoral factors, namely industry level R&D intensity and Herfindahl index in the SG-LoDIMF are constructed from the CMIE's Prowess database.

Relevant state-specific measures were collected from published sources from different government and non-government agencies. The annual data related to states' real Gross State Domestic Product (SDP), growth of real SDP, and real per capita SDP were drawn from nominal and real series reported in various *Statements on State Domestic Product* released by the Central Statistical Organization (CSO). Information on patent application filed according to state of origin was compiled from various Annual Reports of the Controller General of Patents, Designs & Trade Marks. Number of manufacturing factories and the share of technology-intensive industries in manufacturing net value-added per state are collected / estimated based on state-wise National Industrial Classification (NIC) 3 digit industry data published in *Annual Survey of Industries* (ASI) by the CSO. High-technology manufacturing segment is defined to include chemicals, pharmaceuticals, electrical & optical equipment, machinery & equipment and transport equipment.

State-wise road and railway route length are respectively obtained from various issues of *Basic Road Statistics of India*, Ministry of Road Transport and Highways, and *Indian Railway Year Book*, Ministry of Railways. Tele-density data for Indian states came from the *Compendium of Selected Indicators of Indian Economy* (Volume I) of the CSO (2009). *Annual Report on the Working of State Electricity Boards & Electricity Departments* of the Planning Commission (Power and Energy Division), various years and *General Reviews* published by Central Electricity Authority, Ministry of Power provided gross power generation by states. State level credit advance by commercial banks is collected from various volumes of *Money and Banking* brought out by the CMIE. Higher education enrolments for Indian states are sourced from various issues of the *Selected Educational Statistics,* Department of Higher Education, Ministry of Human Resource Development (MHRD) and various annual reports of the MHRD, Government of India. State-wise number of towns is collected from *Census of India* 1991 and 2001.

State-wise FDI stock was estimated by cumulating FDI inflows data since 1982-83. The FDI inflows data from 1982-83 to 2003-04 are on approval terms and from 2004-05 onwards inflows are on actual basis. FDI data up to 2003-04 came from foreign collaborations dataset maintained by the Institute of Studies in Industrial Development and from 2004-05 the information was obtained from *SIA Newsletter*, Annual Issues of which various years have been used. It should be noted that the data related to the sub-period since 2004-05 are FDI actual inflows data classified as per the RBI (Reserve Bank of India) regions.

It is important to mention here that the empirical estimation has been done for the sample of single-state based firms only and for the period 1995-2008. This implies that we have excluded multi-state based firms from the analysis so as to avoid complexity in dividing each variable of a multi-state based firm among its host states. Considering single-state based firms would simplify the analysis as well as enable meaningful interpretation of the empirical findings. The choice of the time period is dictated by the availability of state-level indicators specifically for newly created states in 2000.

Estimation Issues and Methods

In the specification of the export function formulated as Model-A, export intensity (y) is a fractional response variable bounded between 0 per cent for non-exporter and 100 per cent (or 1 in the case of ratio) for wholly export oriented firms with the possibility of clustering of multiple numbers of observations at the boundaries. This is because not all firms in the sample do exporting in a given year. For example, about 50 per cent of the firms' observations in our sample possess zero export during the study period 1995-2008.

The objective here is to explain y, 0d”*y*d”100 with the help of a $1 \times K$ vector of explanatory variables $x = (x_1, x_2, \ldots, x_k)$. Given the censoring of the dependent variable at its lower and upper bounds, the proposition of a linear conditional mean specification of y, $E(y|x) = x\beta$ where β is a $K \times 1$ vector of coefficients, has limited appeal to researchers. This is because the effect of any explanatory variable becomes non-linear and cannot be constant throughout its entire range as assumed by the linear specification (Papke and Wooldridge, 1996; Ramalho, Ramalho and Murteira, 2011). Moreover, predicted values from such a linear specification do not necessary lie in the unit interval.

A popular approach to the conditional mean of y is to model the log-odds ratio as a linear function: $E(\log[y/(1-y)|x) = x\beta$ which is basically a linearization of the logistic formulation: $E(y|x) = e^{x\beta} / (1- e^{x\beta})$. It is obvious that this log-odds transformation of the original dependent variable requires the responses to be strictly between zero and one. If there are y observations at the boundary values of zero and one, then ad hoc adjustments must be made for arriving at the log-odds ratio (Ramalho, Ramalho and Murteira, 2011). If a large proportion of the data is at the extremes, ad hoc adjustments to large number of extreme values may be least plausible (Papke and Wooldridge, 1996). Further, recovering $E(y|x)$ from the estimated model necessitates additional assumptions.

The possibility of a non-negative response variable having multiple observations at the upper and/or lower limits has led to the development of the Tobit model in the literature. The Tobit model introduces a latent variable $y^* = E(y^*|x) + \varepsilon$ where its conditional expectation is described as a linear function: $E(y^*|x) = x\beta$. The observed y values are assumed to becomes latent y values if $y^* > 0$ and to attain a zero value if y^* d" 0. Here y is interpreted as a censored variable because its true values are observable for a restricted range of observations while values of independent variables x are known for all observations. Tobin (1958) suggested that consistent estimates for such limited dependent variable can be obtained by the use of the maximum likelihood (ML) estimation. However, the Tobit model requires stronger assumptions of normality and homoskedasticity and any deviation thereof render the ML estimates as inconsistent. Importantly, the use of a censored regression technique like Tobit on proportions data that contains 0, 1 and intermediate values is not an appropriate strategy as the observed data is not truly censored in its character but are a natural outcome of individual choices (Ramalho, Ramalho and Murteira, 2011; Baum, 2008). For proportions data, values outside the [0,1] interval are not feasible as they are naturally bounded.

Given the limitations of above methods, recently fractional logit model (FLM) has been proposed as more appropriate method for modeling bounded dependent variables with observations at the boundaries. While Papke and Wooldridge (1996) formulated FLM, Ramalho and Silva (2009) extended the same into two-part fractional model (TFM) and Papke and Wooldridge (2008) extended it to the panel data through fractional panel probit model (FPPM). The first part of the TFM consists of a discrete component formulated as a standard binary choice model and, conditional on this decision, a continuous component is expressed as a fractional regression equation for the second part. As the FPPM requires the inclusion of explanatory variables, x_{it}, their individual-specific time averages $\bar{x}_i$ and year dummies, the sample data invariably exhibit widespread and severe multicollineairty. In view of this limitation, FML with control for year dummies has been chosen as the preferred method of estimation.

Fractional Logit Model (FLM)

Papke and Wooldridge (1996) proposed a quasi-maximum likelihood (QML) estimator to describe the data generation process for y on the closed interval

[0, 1]. The conditional expectation of y is defined as $E(y|x) = G(x\beta)$ where G(.) is a known nonlinear function and is well defined even if y assumes 0 or 1 with positive probability. Any cumulative distribution function may be specified for G(.) including Bernoulli for binary data. Taking the Bernoulli log-likelihood function, $LL_i(\beta) = y_i \log[G(x_i\beta)]+(1- y_i) \log[1-G(x_i\beta)]$, which is a density in the linear exponential family (LEF), the QML estimator $\hat{\beta}$ is derived by maximizing the $\sum_{i=1}^{N} LL_i(\hat{\beta})$ with respect to $\hat{\beta}$.

With the correct specification of $E(y|x) = G(x\beta)$, the obtained estimator is consistent and asymptotically normal regardless of the true distribution of y_i conditional on x_i and nature of y_i (i.e., continuous or discrete, or posses both continuous and discrete characteristics). Oberhofer and Pfaffermayr (2012) replicated the fractional logit results of the seminal paper of Papke and Wooldridge (1996) based on the standard routines provided in the statistical software, Stata and observed that their proposed RESET specification test is useful for detecting neglected non-linearities in the small samples. In the export literature, Wagner (2001) has used the QML method based on the logistic specification, which is the fractional logit model, to examine relationship between the firm size and exports for a sample of German manufacturing establishments.

In the statistical package, STATA, one can use GLM command with the option for bootstrap standard errors for obtaining QML estimates for FLM[1]. Theoretically, the export model specification A suffers from endogeneity problem as a number of firm-level independent variables are not strictly exogenous. For instance, the empirical literature suggests that firms R&D performance may be influenced by its export activities (e.g., Pradhan, 2011). Similarly, export intensity might have a favourable feedback with other factors like firm survival (age), size, purchase of foreign technologies and advertising expenses. So, one may expect that there may be endogeneity bias due to possible reverse feedbacks from the dependent variable to these explanatory variables. To minimize any such bias, the study has introduced all the firm-specific variables, except *AFF* and *BGA* dummies, in one year lagged form.

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1 STATA command for the quasi-MLE is glm $y\ x_1 \ldots x_k$, $\bar{x}_1 \ldots \bar{x}_k$ d2…dT, fam(bin) link(logit) irls where d2…dT are time dummies.

Multicollinearity is another common problem expected in a multidimensional empirical setting covering 26 explanatory variables. Among firm-specific variables, firm size (*SIZE*) and its squared term ($SIZE^2$) are found to be highly correlated. In order to address this problem, mean centred series has been used in place of *SIZE* (and $SIZE^2$). Within the state-specific variables, the variance inflating factor (VIF) for $STKS_{kt}$, SDP_{kt}, SKL_{kt}, and $PSDP_{kt}$ stands at 27, 24,18, and 12, respectively. The condition number for the matrix of explanatory variables including year dummies is found to be as high as 645.

To minimize adverse effects of the multicollinearity on standard errors of estimates, we ran different auxiliary regressions fitting variables with high VIF values on selected regional factors with which each had strong correlation (i.e., variables having at least 0.5 magnitude of correlation coefficient) in a sequential process. The auxiliary regression that contributed maximum reduction in the condition number was first estimated and residual from this regression is used in the place of original variable. Analysis of multicollinearity was again done on the matrix of independent variables containing the residual of the first replaced variable. At this stage the auxiliary regression that contributes maximum reduction in the remaining condition number was estimated and residual thereof is used to replace the concerned original variable. In this way, a total of four auxiliary regressions are thus estimated and residuals have been used in place of four original variables[2].

5. Estimation Results and Inferences

The empirical model A is estimated for an unbalanced sample of 6494 single state-based manufacturing firms for the period 1995-2008. Empirical results obtained from FLM with bootstrap standard errors based on 1000 replications are summarized in Table-2. After examining the role of firm-specific variables in exporting under regression 1, the specification of regression 2 extends the focus to include firm-specific factors, sectoral level characteristics and fiscal incentives that may drive firms' export activities. Regression 3 and 4 intend to provide full-blown models that combine conventional firm and sectoral level determinants and spatial variables to address the possible role of space. High Chi-square values for the estimated

[2] Auxiliary regressions are: (i) *PSDP* on *STKS*, *SPWR, STI*, and *SFN*; (ii) *SDP* on *STKS*, *SKL*, *SPWR,* and *TWN*; (iii) *SKL* on *STKS*, *TWN;* (iv) *TWN* on *STKS*.

models suggest that their fitted specifications succeed well in capturing firm's export performance through inclusion of relevant variables. The performance of non-regional variables is discussed below.

5.1. Firm-specific Determinants of Exports

Among the firm-specific variables included in the model, $SIZE_{it-1}$, $ETP2_{it-1}$, and $RDIN_{it-1}$ are found to have consistently significant and positive effect across estimations. As the squared term of firm size, $SIZE^2_{it-1}$, also comes out with a strong negative coefficient throughout, it verifies that the relationship between firm size and export intensity is non-linear for Indian manufacturing firms even after controlling for the effects of regional factors. It could be infer that increases in firm size promote exports of Indian firms but up to some critical level of sales.

The strong positive effect of $RDIN_{it-1}$ corroborates the critical role that in-house technological activities play in firms export behaviours in the manufacturing sector. Hence, firms with higher R&D activities are likely to have greater edge in performing exports. The positive influence of $ETP2_{it-1}$ can be interpreted as a support for the contention that Indian firms importing foreign technologies in embodied forms of machineries and capital goods are better placed in undertaking export activities. The insignificant coefficients of $ETP1_{it-1}$ across estimations suggest that Indian manufacturing firms importing disembodied foreign technologies are per se not deriving any special export advantage from such imports. This might be a reflective of widespread export restriction clauses that suppliers of foreign disembodied technologies tend to impose on Indian firms.

AGE_{it-1} has a negative and significant coefficient throughout while explaining variation in export intensity of the sample manufacturing firms. This suggest that younger firms are better export intensive than older firms. As India is witnessing the phenomenon called 'born global firms' where firms are internationalizing soon after their inception (Varma, 2011) the influence of firm age on export performance is probably turning negative overtime.

Table 2: Regional Factors in Firms' Export Behaviour in Indian Manufacturing Sector

Dependent Variable: Export Intensity

Independent variables	Coefficients (Absolute bootstrap Z-statistic)			
	Regression-1	**Regression-2**	**Regression-3**	**Regression-4**
AGE_{it-1}	-0.37769 (25.62)***	-0.36586 (25.13)***	-0.36833 (24.45)***	-0.38977 (26.16)***
$SIZE_{it-1}$	0.169807 (23.56)***	0.165639 (20.81)***	0.167292 (20.81)***	0.174012 (21.40)***
$SIZE^2_{it-1}$	-0.01739 (6.54)***	-0.01583 (5.62)***	-0.01614 (5.49)***	-0.01665 (5.60)***
$ETP1_{it-1}$	-0.00907 (1.07)	-0.00669 (0.81)	-0.00743 (0.91)	-0.00708 (0.86)
$ETP2_{it-1}$	0.000996 (4.23)***	0.00096 (3.99)***	0.000971 (3.95)***	0.000959 (3.97)***
$RDIN_{it-1}$	0.040104 (4.40)***	0.036213 (3.92)***	0.036549 (4.15)***	0.035611 (4.27)***
ADV_{it-1}	-0.00343 (0.89)	-0.00354 (0.84)	-0.00354 (0.84)	-0.00319 (0.8)
AFF_{i}	-0.07409 (1.78)*	-0.03223 (0.76)	-0.05219 (1.24)	-0.05975 (1.4)
BGA_{i}	-0.13356 (5.19)***	-0.10453 (4.02)***	-0.11387 (4.45)***	-0.1237 (4.68)***
HI_{jt}		-0.10378 (4.83)***	-0.10524 (5.04)***	-0.09927 (4.83)***
RDS_{jt}		0.02855 (1.92)*	0.01783 (1.24)	0.019509 (1.37)
FSB_{it-1}		0.268639 (10.26)***	0.266012 (10.44)***	0.26849 (9.90)***
SDP_{kt}			0.196796 (10.84)***	0.13572 (0.32)
$SDPG_{kt}$			0.000212 (0.07)	0.000232 (0.07)

Independent variables	Coefficients (Absolute bootstrap Z-statistic)			
	Regression-1	Regression-2	Regression-3	Regression-4
$PSDP_{kt}$			0.286138	-0.15756
			(7.75)***	(0.32)
$SPAT_{kt}$				0.082203
				(5.43)***
SKL_{kt}				-0.17149
				(2.07)**
$SPWR_{kt}$				-0.00197
				(2.42)**
$STRP_{kt}$				-5E-06
				(0.06)
$SPRT_{kt}$				0.34486
				(8.69)***
STI_{kt}				0.002699
				(0.77)
SFN_{kt}				0.000469
				(2.52)**
$SFDI_{kt}$				-0.01102
				(5.94)***
SSC_{kt}				0.000099
				(0.85)
TWN_{kt}				-0.07646
				(1.09)
SPL_{kt}				0.001729
				(1.58)
Constant	-1.02613	-0.4909	-5.47051	-1.18642
	(16.04)***	(3.70)***	(13.47)***	(7.18)***
χ^2-value!	1292	1459	1697	2115
Prob > χ^2	0.0000	0.0000	0.0000	0.0000
Observations	41830	41830	41830	41830
No. of exporting firms @	3775			
No. of total firms@	6494			
Proportion of exporting firms@	58.1			

Notes: Absolute value of bootstrap t-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; !-test values are obtained from the independent tests conducted to check if the coefficient of all explanatory variables are simultaneously zero using the testparm command in the STATA; @- Single counting of number of firms in the sample appearing at least once in the study period; Year dummies are included in the estimation.

ADV_{it-1}, AFF_i and BGA_i each turns up with a negative sign consistently across estimations. Statistically the negative coefficient of ADV_{it-1} is not different from zero. This indicates that the domestic advertising and brand advantages of Indian firms are less effective in international markets. AFF_i generally has an insignificant coefficient and it could assume modest significance only in regression 1. This finding is on the contrary to the earlier results on foreign affiliates reported in Aggarwal (2002) and Kumar and Pradhan (2007) that such firms are better at export intensity than their domestic counterpart. As the FLM is theoretically more appropriate than the Tobit model used in the earlier studies, one may infer that export efforts of foreign firms in India are not different from that of domestic firms.

BGA_i consistently has a negative coefficient, which is highly significant. Hence, Indian manufacturing firms having affiliation to domestic business groups are relatively more active in domestic market than export activities when compared to standalone firms that are more export intensive.

5.2. Fiscal Incentives and Sectoral Determinants of Exports

Two sector-specific factors included in regression 2 emerged with statistically significant coefficients suggesting that firms export performance is substantially influenced by sectoral specificities. HI_{jt} has a negative sign consistently over estimations and is different from zero. This means that growing domestic market concentration in an industry will tend to adversely affect its firms' export intensity. In the absence of an intense competition, dominating firms in a large market like India have little incentive for exploring new markets.

RDS_{jt} shows up with a positive and significant effect in the case of regression 2 while its positive coefficient fails to achieve significance level in regression 3 and 4. It would suggest that manufacturing firms from R&D intensive industries generally enjoy some advantage in exporting than other firms. However, this favourable export effect of sectoral R&D gets absorbed into regional heterogeneity when spatial factors are included in the estimation.

The sole policy variable, FSB_{it-1}, has a significantly positive effect across the estimations. That would imply that fiscal incentives for exporting are a crucial determinant of firms' export behaviour in the emerging economy context.

5.3. Spatial Determinants of Exports

In this subsection the role of regional variables in exporting are discussed. Of the three local market related variables, SDP_{kt}, $SDPG_{kt}$ and $PSDP_{kt}$ respectively representing the effect of size of local market, local market growth and per capita income growth on firms export intensity, only SDP_{kt} and $PSDP_{kt}$ come up with a significantly positive effect in regression 3. Therefore, firms based in states with large local markets and high per capita incomes are more likely to have higher export-orientation. As the variety of goods produced in a market increases with the increase in income of the local consumers (Linder, 1961; Jackson, 1984), there is an expansion of the range of product variety supplied by domestic producers who may find it convenient to export to other countries (Ramezzana, 2000). The product variety enlarging effects of growing per capita income is likely to take place even among sub-national regions and states with large per capita income may significantly influence firm's international drive through exports.

When non-market related spatial factors are brought under the estimation in regression 4, the positive coefficients of SDP_{kt} and $PSDP_{kt}$ could no longer achieve any acceptable level of statistical significance. While local market related factors tend to promote manufacturing firms' exports generally but some strength of their positive effects in essence is appeared to been captured by other spatial factors.

$SPAT_{kt}$, which measures state's technological knowledge stock, has a statistically significant positive effect. Thus, firms located in states with larger knowledge stocks are likely to focus more on export markets. This supports the hypothesis that availability of greater stock of knowledge leads to abundance of critical firm-specific intangible assets and an intertemporal spillover of ideas to facilitate the formation of new ideas that eventually motivate higher export intensity of local firms.

SKL_{kt} has a negative sign and achieves statistical significance. Ceteris paribus, state's increasing level of skills pushes local firms more into domestic markets than overseas operation. It is an interesting finding that the advantage of higher skills in host states may drives local firms to supply more to domestic markets but these firms move abroad only when host states possess substantial technological stocks.

Among infrastructure variables, $SPWR_{kt}$ turns up with a negative but significant coefficient. This is on the contrary to our prediction that availability of power could be significant for firms' exporting. Apparently, export oriented firms in Indian manufacturing come from host states characterized with relatively less availability of power. In this study, the power availability is measured by a state's own power generation and power deficit/surplus states in India are identified based on the assessment the power supply position of each state (Central Electricity Authority, 2013). A large number of power deficit states in India include those that contribute large share in exports from India such as Karnataka, Tamil Nadu, Maharashtra, and Andhra Pradesh.

The land transportation network, $STRP_{kt}$, has an insignificant and negative coefficient. Thus, inter-state variation in the export behaviour of the firms is less affected by the availability of land transportation links but by other spatial factors included in the estimation. $SPRT_{kt}$ is found with a positive and significant effect. This suggests that the presence of port facilities in a state is more likely to support higher export intensity of local firms.

STI_{kt} has a predicted positive sign but misses the level of statistical significance. However, SFN_{kt} has a significantly positive effect on firms export intensity. While the level of telecommunication infrastructure in states is not much of significance for inter-state variation in firms' exporting, the provision of adequate finance is likely to favour firms' export intensity.

$SFDI_{kt}$ appears with a negative sign and is strongly significant. States hosting relatively greater volume of foreign investments, thus, are likely to be characterized by lower export intensity of their firms. The negative competitive effect of foreign investments that drives domestic firms to be more aggressive on local markets is possibly negating favourable effects associated with the presence of foreign firms like demonstration effect, generation of linkages, learning for exports, etc.

SSC_{kt} and TWN_{kt} both had coefficients statistically not different from zero. The spatial concentration of diverse firms may have significant agglomeration advantages for competition but it could be that such concentration of same sector firms (i.e. clustering) might be more relevant for firms' export behaviour. While cities and urban centres are emerging as sources of innovation, their role in exports is yet to be critical in the case of India.

SPL_{kt} representing the technology-intensive structure of production has a positive coefficient that attained significance at 11 per cent level, which is close to the acceptable modest level of statistical significance (i.e., 10 per cent). Therefore, technology-intensive production structures of Indian states may modestly be translating into some gain in export intensity of Indian firms.

6. Conclusions

The present study is a preliminary enquiry into identifying determinants of inter-state patterns of firms' export intensity – an issue of increasing policy relevance for the Indian states. Previous studies on the subject for India as well as other emerging economies have largely ignored the vital role of subnational factors. Drawing upon diverse range of theoretical knowledge, the relevance of region-specific factors in export performance has been established by descriptive causal theoretical arguments. A set of regional factors identified as potential export determinants are integrated into an eclectic empirical framework specifically formulated for the analysis of firm's export-intensity. Empirical results in general confirmed that regional factors do play a role in firms' export involvements, often with differential performance for different spatial factors.

States with higher technological knowledge stocks, port facilities and adequate finance turn out to be more successful in improving firm-level export intensity. Sub-national policy measures for expanding regional technological activities, access to port facilities, and credit advance by commercial banks, thus, may help states in boosting firms' export activities.

When competing on the advantage of higher skills available in host states, Indian manufacturing firms turn to domestic markets more but the advantage of higher regional technological stocks is driving them into overseas markets. It is also found that states hosting greater stock of FDI are likely to have lower export intensity among local firms. Either the FDI projects in India are continuing to be market-seeking in character or they generate more negative competitive outcome over their positive effects in making local firms aggressive on local markets.

States having technology-intensive manufacturing structure are likely to be characterized by higher export intensity of their firms. While the market size and per capita income of the host state have had a favourable effect on firms' exporting, their influence is not captured in their entirety when other spatial factors are also present in the analysis.

The findings of the study confirm that the firm level exports are considerably influenced by characteristics of firms themselves. Firms export performances are intimately related to their size, R&D and imports of capital goods. Promoting in-house R&D can be important policy measures for Indian states to maximize their export-led growth potential. The role of new enterprises is also seen to be significant for exports from overall manufacturing sector.

More concentrated sectors are observed as not conductive for firms' greater export involvements. Hence, states with manufacturing sector characterized by sizeable presence of old and established firms, domestic business group affiliates, and concentrated industries are required to make extra policy efforts in helping and motivating these firms to undertake growing exporting.

The provision of fiscal incentives is another important factor shaping firms' export performance. Indian states may continue to use fiscal incentives as a key component of policy strategy for stimulating exports by local firms.

References

Acs, Z. J., L. Anselin and A. Varga (2002), 'Patents and Innovation Counts as Measures of Regional Production of New Knowledge', *Research Policy*, 31 (7), pp.1069–1085.

Acs, Z. J., R. Morck, J. M. Shaver, and B. Yeung (1997), 'The Internationalization of Small and Medium-Sized Enterprises: A Policy Perspective', *Small Business Economics*, 9 (1), pp. 7–20.

Aggarwal, A. (2002), 'Liberalisation, Multinational Enterprises and Export Performance: Evidence from Indian Manufacturing', *Journal of Development Studies*, 38 (3), pp. 119–137.

Amable, B. and B. Verspagen (1995), 'The Role of Technology in Market Shares Dynamics', *Applied Economics*, 27 (2), pp. 197–204.

Amendola, G., G. Dosi and E. Papagni (1993), 'The Dynamics of International Competitiveness', *Weltwirtschaftliches Archiv*, 129 (3), pp. 451–471.

Anh, N.N., P. Q. Ngoc, N.D. Chu, and N.D. Nhat (2007), 'Innovation and Export of Vietnam's SME Sector', Paper for UNU-MERIT Conference on Micro-Evidence on Innovation in Developing Economies.

Asheim, B.T. and M. Gertler (2005), 'The Geography of Innovation: Regional Innovation Systems', in J. Fagerberg, J., D. Mowery and R. Nelson (eds.), *The Oxford Handbook of Innovation*, pp. 291–317, Oxford: Oxford University Press.

Athey, G., C. Glossop, B. Harrison, M. Nathan and C. Webber (2007), *Innovation and the City: How Innovation has Developed in Five City-Regions*, London: National Endowment for Science, Technology and the Arts (NESTA).

Barney, J. (1991), 'Firm Resources and Sustained Competitive Advantage', *Journal of Management*, 17 (1), pp. 99–120.

Barrios, S., H. Gorg, and E. Strobl (2003), 'Explaining Firms' Export Behaviour: R&D, Spillovers and the Destination Market', *Oxford Bulletin of Economics and Statistics*, 65 (4), pp. 475–496.

Baum, C.F. (2008), 'Stata Tip 63: Modeling Proportions', *The Stata Journal*, 8 (2), pp. 299–303.

Beccatini, G., M. Bellandi, G. Dei Ottati, and F. Sforzi (2003), *From Industrial Districts to Local Development: An Itinerary of Research*, Cheltenham, UK: Edward Elgar.

Bernard, A. and J.B. Jensen (1995), 'Exporters, Jobs and Wages in US Manufacturing: 1976–1987', *Brookings Papers on Economic Activity*, Microeconomics, 1995, pp. 67–119.

Bernard, A. B., J. Eaton, B. Jensen, and S. Kortum (2003), 'Plants and Productivity in International Trade', *American Economic Review*, 93 (4), pp. 1268–1290.

Bernard, A.B. and J. Wagner (2001), 'Export Entry and Exit by German Firms' *Weltwirtschaftliches Archiv*, 137 (1), pp.105–123.

Bernard, A.B. and J.B. Jensen (1999), 'Exceptional Exporter Performance: Cause, Effect, or Both?', *Journal of International Economics*, 47 (1), pp.1–25.

Bettencourt, L.M.A., J. Lobo, D. Strumsky (2007), 'Invention in the City: Increasing Returns to Patenting as a Scaling Function of Metropolitan Size', *Research Policy*, 36 (1), pp. 107–120.

Bleaney, M. and K. Wakelin (1999), 'Sectoral and Firm-Specific Determinants of Export Performance: Evidence from the United Kingdom', *GLM Research Paper*, No. 99/12, University of Nottingham.

Bonaccorsi, A. (1992), 'On the Relationship between Firm Size and Export Intensity', *Journal of International Business Studies*, 23 (4), pp. 605–635.

Braunerhjelm, P. (1996), 'The Relationship between Firm-specific Intangibles and Exports', *Economic Letters*, 53 (2), pp. 213–219.

Brooks, D.H. and D. Hummels (eds.) (2009), *Infrastructure's Role in Lowering Asia's Trade Costs: Building for Trade*, Cheltenham, UK: Edward Elgar.

Calof, J.L. (1994), 'The Relationship between Firm Size and Export Behaviour Revisited', *Journal of International Business Studies*, 25 (2), pp. 367–387.

Camagni, R. P. (1995), 'The Concept of Innovative Milieu and Its Relevance for Public Policies in European Lagging Regions', *Papers in Regional Science*, 74 (4), pp. 317–340.

Cavusgil, S.T. and S. Zou (1994), 'Marketing Strategy-Performance Relationship: an Investigation of the Empirical Link in Export Market Ventures', *Journal of Marketing*, 58 (1), pp. 1–21.

Central Electricity Authority (2013), *Load Generation Balance Report 2013–14*, Ministry of Power, Government of India, New Delhi: Central Electricity Authority.

Chamberlain, G. (1980), 'Analysis of Variance with Qualitative Data', *Review of Economic Studies*, 47 (1), pp. 225–238.

Conner, K.R. (1991) 'A Historical Comparison of Resource-Based Theory and Five Schools of Thought within Industrial Organization Economics: Do We Have a New Theory of the Firm?', *Journal of Management*, 17 (1), pp. 121–154.

Cooke, P., M.G. Uranga and G. Etxebarria (1997), 'Regional Innovation Systems: Institutional and Organisational Dimensions', *Research Policy*, 26 (4–5), pp. 475–491.

Das, K. (2008), 'Fostering Competitive Clusters in Asia: Towards An Inclusive Policy Perspective', *VRF Monograph*, No. 437, Chiba: Institute of Developing Economies.

Das, K. (ed.) (2005), *Indian Industrial Clusters*, Aldershot, UK: Ashgate.

de la Torre, J.R.(1971), 'Exports of Manufactured Goods from Developing Countries: Marketing Factors and the Role of Foreign Enterprise', *Journal of International Business Studies*, 2 (1), pp. 26–39.

Doloreux, D. (2002), 'What Should We Know about Regional Systems of Innovation?', *Technology in Society*, 24 (3), pp. 243–263.

Doloreux, D. and S. Parto (2004), 'Regional Innovation System: A Critical Synthesis', *INTECH Discussion Paper*, No. #2004-17, United Nations University, The Netherlands: Institute for New Technologies.

Dosi, G. (1997), 'Opportunities, Incentives and the Collective Patterns of Technological Change', *Economic Journal*, 107 (444), pp. 1530–1547.

Dosi, G. and L. Soete (1988), 'Technical Change and International Trade', in G. Dosi, C. Freeman, R. Nelson, G. Silverberg and L. Soete (eds), *Technical Change and Economic Theory*, pp. 401–431, London: Pinter Publisher.

Ericson, R. and A. Pakes (1995), 'Markov-perfect Industry Dynamics: A Framework for Empirical Work', *Review of Economic Studies*, 62 (1), pp. 53–82.

Fagerberg, J. (1988), ‘International Competitiveness’, *Economic Journal*, 98 (391), pp. 355–374.

Fernandez, Z and M. J. Nieto (2005) ‘Internationalization Strategy of Small and Medium-sized Family Business: Some Influential Factors’, *Family Business Review*, 18 (1), pp. 77–89.

Fitzgerald, B. and T. Monson (1989), ‘Preferential Credit and Insurance as Means to Promote Exports’, *The World Bank Research Observer*, 4 (1), pp. 89–114.

Francois, J. and M. Manchin (2007), ‘Institutions, Infrastructure, and Trade’, *IIDE Discussion Paper*, No. 200704–01, The Netherlands: Institute for International and Development Economics.

Freund, C. and N. Rocha (2010), ‘What Constrains Africa’s Exports?’, *Staff Working Paper ERSD*, No. 2010–07, Economic Research and Statistics Division, Geneva: World Trade Organization.

Fugazza, M. (2004), *Export Performance and Its Determinants: Supply and Demand Constraints*, Policy Issues in International Trade and Commodities Study Series, No. 26, United Nations Conference on Trade and Development, New York and Geneva: United Nations.

Fujita, M. and P. Krugman (2004), ‘The New Economic Geography: Past, Present and the Future’, *Papers in Regional Science*, 83 (1), pp. 139–164.

Fujita, M., P. Krugman, and A.J. Venables (1999), *The Spatial Economy: Cities, Regions and International Trade*, Cambridge MA: MIT Press.

Guillén, M.F. (2000) ‘Business Groups in Emerging Economies: A Resource-Based View’, *The Academy of Management Journal*, 43 (3), pp. 362–380.

Holzmuller, H.H. and B. Stottinger (1996), ‘Structural Modeling of Success Factors in Exporting: Cross-validation and Further Development of an Export Performance Model’, *Journal of International Marketing*, 4 (2), pp. 29–55.

Jackson, L.F. (1984), ‘Hierarchic Demand and the Engel Curve for Variety’, *Review of Economics and Statistics*, 66 (1), pp. 8–15.

Johanson, J. and J.E. Vahlne (1977), ‘The Internationalization Process of the Firm: A Model of Knowledge Development and Increasing Foreign Market Commitments’, *Journal of International Business Studies*, 8 (1), pp. 23–32.

Johanson, J. and J. E. Vahlne (2006), 'Commitment and Opportunity Development in the Internationalization Process: A Note on the Uppsala Internationalization Process Model', *Management International Review,* 46 (2), pp. 165 178.

Johansson, J. and F. Wiedersheim-Paul (1975), 'The Internationalization of the Firm-four Swedish Case', *Journal of Management Studies*,12 (3), pp. 305–322.

Johansson, J. and J. E. Vahlne (1990), 'The Mechanism of Internationalization', *International Marketing Review*, 7 (4), pp. 11–24.

Jovanovic, B. (1982), 'Selection and the Evolution of Industry', *Econometrica*, 50 (3), pp. 649–670.

Khanna, T. and K. Palepu (2000), 'The Future of Business Groups in Emerging Markets: Long Run Evidence from Chile', *Academy of Management Journal*, 43 (3), pp. 268–285.

Koenig, P. (2009), 'Agglomeration and the Export Decisions of French Firms', *Journal of Urban Economics*, 66 (3), pp. 186–195.

Komninos, N. (2002), *Intelligent Cities: Innovation, Knowledge Systems and Digital Spaces*, London and New York: Taylor and Francis.

Krugman, P. (1991a), 'Increasing Returns and Economic Geography', *Journal of Political Economy*, 99 (3), pp. 483–499.

Krugman, P. (1991b), *Geography and Trade*, Cambridge MA: MIT Press.

Kumar, N. and J.P. Pradhan (2007), 'Knowledge-Based Exports from India: A Firm-level Analysis of Determinants', in Nagesh Kumar and K.J. Joseph (eds.), *International Competitiveness and Knowledge-based Industries*, pp. 53–96, New Delhi: Oxford University Press.

Lages, L.F. (2000), 'A Conceptual Framework of the Determinants of Export Performance: Reorganizing Key Variables and Shifting Contingencies in Export Marketing', *Journal of Global Marketing*, 13 (3), pp. 29–51.

Lall, S. (2000), 'The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-98*', Oxford Development Studies*, 28 (3), pp. 337–369.

Lefebvre, E., and L.A. Lefebvre (2002), 'Innovative Capabilities as Determinants of Export Performance and Behaviour: A Longitudinal Study of Manufacturing SMEs', in A. Kleinknecht and P. Mohnen (eds.), *Innovation and Firm Performance: Econometric Explorations of Survey Data*, pp. 281–309, London: Palgrave.

Levinthal, D.A. (1998), 'The Slow Pace of Rapid Technological Change: Gradualism and Punctuation in Technological Change', *Industrial and Corporate Change*, 7 (2), pp. 217–247.

Lim, U. (2003), 'The Spatial Distribution of Innovative Activity in U.S. Metropolitan Areas: Evidence from Patent Data', *The Journal of Regional Analysis and Policy*, 33 (2), pp. 97–126.

Linder, S. (1961), *An Essay on Trade and Transformation*, Uppsala: Almqvist and Wiksells.

Loannidis, E. and P. Schreyer (1997), 'Technology and Non Technology Determinants of Export Share Growth', *OECD Economic Studies*, No. 28, Paris: Organization for Economic Co-operation and Development.

Lundvall, B.-Å. (1992), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London: Routledge.

Lundvall, B-Å and S. Borrás (1997), *The Globalising Learning Economy: Implications for Innovation Policy.* Brussels: Commission of the EU.

Maillat, D. (1998), 'From the Industrial District to the Innovative Milieu: Contribution to an Analysis of Territorialised Productive Organisations', *Recherches Economiques de Louvain*, 64 (1), pp. 111–129.

Markusen, A. (1996), 'Sticky Places in Slippery Space: A Typology of Industrial Districts', *Economic Geography*, 72 (3), pp. 293–313.

Matthee, M. and W. Naude (2008), 'The Determinants of Regional Manufactured Exports from a Developing Country', *International Regional Science Review*, 31 (4), pp. 343-358.

Mbekeani, K.K. (2010), 'Infrastructure, Trade Expansion and Regional Integration: Global Experience and Lessons for Africa', *Journal of African Economies*, 19 (1), pp. 88–113.

Mbekeani, K.K. (2007), 'The Role of Infrastructure in Determining Export Competitiveness: Framework Paper'. Nairobi: African Economic Research Consortium.

Melitz, M. (2003), 'The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity', *Econometrica*, 71 (6), pp. 1695–1725.

Morris, S., R. Basant, K. Das, K. Ramachandran and A. Koshy (2001), *The Growth and Transformation of Small Firms in India*, New Delhi: Oxford University Press.

Munch, J.R. and J. R. Skaksen (2008), 'Human Capital and Wages in Exporting Firms', *Journal of International Economics*, 75 (2), pp. 363–372.

Muro, M. and B. Katz (2010), 'The New 'Cluster Moment': How Regional Innovation Clusters can Foster the Next Economy', *Brookings Institution Paper*, Washington, DC: Metropolitan Policy Program at Brookings.

Mytelka, L.K. and F. Farinelli (2000), 'Local Clusters, Innovation Systems and Sustained Competitiveness', *UNU/INTECH Discussion Paper*, No. 2000–5, Maastricht: United Nations University, Institute for New Technologies.

Nelson, R.R. (1995), 'Recent Evolutionary Theorizing about Economic Change', *Journal of Economic Literature*, 33 (1), pp. 48–90.

Nelson, R.R. and S.G. Winter (1982), *An Evolutionary Theory of Economic Change,* Cambridge: Bellknap Press.

Newbould, G., P.J. Buckley and J.C. Thurwell (1978) *Going International: The Experience of Smaller Companies Overseas*, London: Associated Business Press.

Oberhofer, H. and M. Pfaffermayr (2012), 'Fractional Response Models - A Replication Exercise of Papke and Wooldridge (1996)', *Contemporary Economics*, 6 (3), pp. 56–64.

Papke, L.E. and J.M. Wooldridge (1996), 'Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates', *Journal of Applied Econometrics*, 11 (6), pp. 619–632.

Papke, L.E. and J.M. Wooldridge (2008), 'Panel Data Methods for Fractional Response Variables with an Application to Test Pass Rates', *Journal of Econometrics*, 145 (1–2), pp. 121–133.

Penrose, E.T. (1959), *The Theory of the Growth of the Firm*, New York: Wiley.

Pérez, R.P., J. Vang and C. Chaminade (2009), 'Regional Innovation Systems in Developing Countries: Integrating Micro and Meso-level Capabilities', in Lundvall, B-Å, K.J. Joseph, C. Chaminade and J. Vang (eds.), *Handbook of Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting*, pp. 140–182, Cheltenham, UK: Edward Elgar.

Perkins, F.C. (1997), 'Export Performance and Enterprise Reform in China's Coastal Provinces', *Economic Development and Cultural Change*, 45 (3), pp. 501 539.

Porter, M.E. (1998), 'Clusters and Competition: New Agendas for Companies, Governments, and Institutions', *Harvard Business School Working Paper*, No. 98–080, Massachusetts: Harvard Business School.

Posner, M.V. (1961), 'International Trade and Technical Change', *Oxford Economic Papers*, 13 (3), pp. 323–341.

Pradhan, J.P. (2008), *Indian Multinationals in the World Economy: Implications for Development*, New Delhi: Bookwell Publisher.

Pradhan, J.P. (2011), 'Regional Heterogeneity and Firms' R&D in India', *Innovation and Development*, 1 (2), pp. 259–282.

Pradhan, J.P. and K. Das (2012), 'Regional Origin of Manufacturing Exports: Inter-State Patterns in India', *Journal of Regional Development and Planning*, 1 (2), pp. 117–167.

Pradhan, J.P. and K. Das (2013), 'Exporting by Indian SMEs: Role of Regional Technological Knowledge, Agglomeration and FDI', *Innovation and Development*, 3 (2), forthcoming.

Pradhan, J.P. and P.P. Sahu (2008), *Transnationalization of Indian Pharmaceutical SMEs*, New Delhi: Bookwell Publisher.

Ramalho, E.A., J.J.S. Ramalho and J. M.R. Murteira (2011), 'Alternative Estimating and Testing Empirical Strategies for Fractional Regression Models', *Journal of Economic Surveys*, 25 (1), pp. 19–68.

Ramalho, J.J.S. and J.V. Silva (2009), 'A Two-part Fractional Regression Model for the Financial Leverage Decisions of Micro, Small, Medium and Large Firms', *Quantitative Finance*, 9 (5), pp. 621–636.

Ramezzana, P. (2000), 'Per Capita Income Demand for Variety, and International Trade: Linder Reconsidered', *CEP Discussion Paper*, No. 460. London: Centre for Economic Performance, London School of Economics and Political Science.

Redding, S. and A. J. Venables (2004), '*Geography and Export Performance: External Market Access and Internal Supply Capacity',* in Baldwin, R.E. and L.A. Winters (eds.), *Challenges to Globalization: Analyzing the Economics*, pp. 95–130, Chicago: Chicago University Press.

Roberts, M.J. and J.R. Tybout (1997), 'The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs', *American Economic Review*, 87 (4), pp. 545–564.

Rothwell, J., J. Lobo, D. Strumsky, and M. Muro (2013), 'Patenting Prosperity: Invention and Economic Performance in the United States and Its Metropolitan Areas', *Brookings Institution Paper*, Washington, DC: Metropolitan Policy Program at Brookings.

Roy, D. K. (1993), 'Impact of Incentives on Export Performance of Bangladesh: A Preliminary Assessment', *Bangladesh Development Studies*, 21 (2), pp. 25–44.

Rutten, R.P.J.H and F.W.M. Boekema (eds.) (2007), *The Learning Region: Foundations, State of the Art, Future*, Cheltenham, UK: Edward Elgar.

Schank, T., C. Schnabel and J. Wagner (2007), 'Do Exporters Really Pay Higher Wages? First Evidence from German Linked Employer-Employee Data', *Journal of International Economics*, 72 (1), pp. 52–74.

Sforzi, F. (2002), 'The Industrial District and the 'New' Italian Economic Geography', *European Planning Studies*, 10 (4), pp. 439–447.

Simmie, J., J. Sennett, P. Wood and D. Hart (2002), 'Innovation in Europe: A Tale of Networks, Knowledge and Trade in Five Cities', *Regional Studies*, 36 (1), pp. 47–64.

Singh, N. (2006) 'R&D, Imports of Technology and Trade Intensities: A Simultaneous Equation Micro-level Examination', in S. Tendulkar, A. Mitra, K. Narayanan and D. Das (eds.), *India: Industrialization in a Reforming Economy–Essays for K.L. Krishna*, pp. 471–491, New Delhi: Academic Foundation.

Soete, L.L.G. (1981) ‘A General Test of the Technological Gap Trade Theory’, *Weltwirtschaftliches Archiv*, 117 (4), pp. 638–660.

Sterlacchini, A. (2001), ‘The Determinants of Export Performance: A Firm-Level Study of Italian Manufacturing’ *Weltwirtschaftliches Archiv*, 137 (3), pp. 450–472.

Storper, M. (1997), *The Regional World: Territorial Development in a Global Economy*, New York: Guilford Press.

Sun, H. (2001), ‘Foreign Direct Investment and Regional Export Performance in China’, *Journal of Regional Science*, 41 (2), pp. 317–336.

Tobin, J. (1958), ‘Estimation of Relationship for Limited Dependent Variables’, *Econometrica*, 26 (1), pp. 24-36.

UNCTAD (1999), *World Investment Report 1999: Foreign Direct Investment and the Challenge of Development*, New York and Geneva: United Nations.

UNCTAD (2002), *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, New York and Geneva: United Nations.

UNCTC (1984), *Costs and Conditions of Technology Transfer through Transnational Corporations*, ESCAP/UNCTC Publication Series B, No. 3, Bangkok: United Nations.

Varma, S. (2011), ‘Born Global Acquirers from Indian IT: An Exploratory Case Study’, *International Journal of Emerging Markets*, 6 (4), pp. 351–368.

Vernon, R. (1966), ‘International Investment and International Trade in the Product Cycle’, *Quarterly Journal of Economics*, 88 (2), pp. 190–207.

Verspagen, B. and K. Wakelin (1997) ‘Trade and Technology from a Schumpeterian Perspective’, *International Review of Applied Economics*, 11 (2), pp. 181–194.

Wagner, J. (2001), ‘A Note on the Firm Size – Export Relationship’, *Small Business Economics*, 17 (4), pp. 229–237.

Wakelin, K. (1998), ‘Innovation and Export Behaviour at the Firm Level’, *Research Policy*, 26 (7–8), pp. 829–841.

WTO (2004), *World Trade Report 2004: Exploring the Linkage between the Domestic Policy Environment and International Trade*, Geneva: World Trade Organization.

Wu, Y. (2007), 'Export Performance in China's Regional Economies', *Applied Economics*, 39 (10), pp. 1283-1293.

Wu, Y., D. Fu, and Y. Tang (2010), 'The Effects of Ownership Structure and Industry Characteristics on Export Performance: Evidence from Chinese Manufacturing Firms', *Economics Discussion Paper, No. 10-09*, Department of Economics, Crawley: The University of Western Australia.

Yang, C.H., J.R Chen and W.B. Chuang (2004) 'Technology and Export Decision', *Small Business Economics*, 22 (5), pp. 349-364.

Zou, S. and S. Stan (1998), 'The Determinants of Export Performance: A Review of the Empirical Literature between 1987 and 1997', *International Marketing Review*, 15 (5), pp. 333–356.

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