

Ownership, technology and buyers: explaining exporting in China and Sri Lanka

Ganeshan Wignaraja *

This paper examines several characteristics besides foreign ownership that influence the decision of clothing firms in China and Sri Lanka whether or not to export – namely, the acquisition of technological capabilities and learning from buyers. As a by-product of the exercise, the model also describes the effect of other explanatory variables (capital, skill adjusted wages and age). The findings indicate that foreign ownership, the acquisition of technological capabilities and learning from buyers are positive and significantly correlated with the probability of exporting in Chinese and Sri Lankan clothing firms. Skill adjusted wages are also significant and with the expected negative sign. Comparative econometric analysis is a powerful tool to verify and extend the findings of detailed enterprise case studies on innovation and learning processes in developing countries.

Key words: foreign investment, technological capabilities, buyers of output, exports, China, Sri Lanka

JEL Classification: F14, O31, L67

1. Introduction

There is a large literature on the determinants of international trade across countries and industries. With the increased availability of firm-level surveys, there has been growing attention to firms' export behaviour using econometric analysis (for surveys see Bleaney and Wakelin, 2002; Rasiah, 2004; and Greenaway and Keller, 2007). Drawing on the literature on applied international trade and investment as well as that on innovation and learning, attempts have been made to explain why some firms are better exporters than

* Principal Economist, Asian Development Bank, Manila. Email address: gwignaraja@adb.org. The views expressed here are solely mine and are not to be attributed to the Asian Development Bank. I am indebted to the late Professor Sanjaya Lall for introducing me to industrial technological development. Thanks are due to Rosechin Olfindo for efficient research assistance and to two reviewers for comments. I am also grateful to suggestions from participants at seminars at UNUMERIT, Maastricht in June 2006, the University of Colombo in December 2006 and Renmin University, Beijing in April 2008.

others. A positive relationship between foreign ownership and firm-level export behaviour emerges from several studies (Lall, 1986; Wilmore, 1992; Rasiah, 2003; Correa et al., 2007; Du and Girma, 2007). The superior export behaviour of foreign firms relative to domestic firms is typically attributed to access to the marketing connections and know-how of their parent companies coupled with accumulated learning experience of producing for export. Research and development (R&D) intensity (and innovation more generally) has also been found to have a positive effect on export behaviour at firm-level (Kumar and Siddharthan, 1994; Ito and Pucik, 1993; Bleaney and Wakelin, 2002).

Case studies of firms have long indicated that exporters in developing countries rarely undertake formal R&D activities at frontiers of technology. Instead, they focus on the difficult process of acquiring technological capabilities to use imported technologies efficiently and learning from buyers of output (e.g. Lall, 1987, 1992; Rhee, 1990; Ernst et al., 1998; and Keesing and Lall, 1992; Wignaraja, 1998; Mathews and Cho, 2002). However, there has been limited econometric analysis to date to verify the findings of case studies. Further econometric study of innovation and learning processes will provide statistical confirmation of case study findings and significantly improve our understanding of firm-level exporting behaviour in developing countries.

This paper examines a variety of characteristics besides foreign ownership that influence a firm's decision of whether or not to export – namely, the acquisition of technological capabilities and learning from buyers. As a by-product of the exercise, the model also describes the effect of other explanatory variables such as capital, wages and age in production. Background studies and hypotheses are reviewed in section 2. The results of Probit estimates carried out on samples of 353 clothing firms in China (surveyed in 2003) and 205 clothing firms in Sri Lanka (surveyed in 2004) are presented in section 3. Both economies sought to promote exports and attract foreign investment by adopting outward-oriented policies in the late-1970s. An improved incentive regime and inward investment has facilitated China's rapid emergence as one of the world's largest clothing exporters and allowed Sri Lanka to achieve the highest clothing exports per capita in South Asia. This paper suggests that technological and marketing factors also underlie export success at firm-level in both countries. The econometric results indicate that foreign ownership, acquisition of technological capabilities and learning from foreign buyers are positively associated with the probability of exporting in Chinese and Sri Lankan clothing firms. Skill adjusted wages are also significant and with the expected negative sign. Section 4 concludes.

2. Background and hypotheses

2.1 Literature

The analysis of firm-level export performance has attracted the attention of two related schools of applied economics. Relatively recently, applied international trade and investment specialists have explored the effects of the theoretical determinants of comparative advantage on firm-level export performance. This literature (which has roots in the neo-Heckscher-Ohlin Model and the neotechnology theories) suggests that the theoretical determinants of comparative advantage, which are traditionally recognized as industry-level factors,¹ can also operate at firm-level (see, for instance, Lall, 1986; Dunning, 1993; Kumar and Siddharthan, 1994; Bleaney and Wakelin, 2002). Conditions of imperfect markets with widespread oligopoly as well as differences in technologies, learning and tastes underlie the notion of firm-specific advantages. It follows that almost all theories of comparative advantage can be firm-specific determining not only which countries will enjoy a comparative advantage in international markets but also which firms can exploit that comparative advantage better than others. Incorporating the notion of firm-specific advantages somewhat modifies the predictions of the theories of international trade as follows: (1) there are country-specific and industry-specific advantages which apply to all firms equally; and (2) within this, some advantages will be firm-specific since certain managerial, organizational, marketing and other skills will be peculiar to each firm as will production methods, technologies and experience based know-how.

The other group with an interest in firm-level export behaviour is the literature on technological capabilities. Focusing on innovation and learning processes in developing countries, this literature emphasizes the acquisition of technological capabilities as a major source of export advantage at firm-level (see Lall, 1987, 1992; Ernst et al., 1998; Mathews and Cho, 2002; Rasiah, 2004; Nelson, 2008). Drawing on the evolutionary theory of technical change, the capability literature underlies the difficult firm-specific processes involved in building technological capabilities to use imported technology efficiently. The

¹ The major trade theories (the Heckscher-Ohlin Model, theories of economies of scale and oligopolistic competition, the neo-technology theories and theories of economic geography) attribute the export performance of an open developing economy to its comparative advantage over another in terms of access to certain factor inputs – capital, labour, economies of scale, technology and geography (for a survey see Deardorff, 2005). Empirical applications to developing countries have sought to explain the export performance of each industry/product in terms of their various characteristics.

central argument is that firms have to undertake conscious investments in search, training, engineering and, even research and development, to put imported technologies to productive use. Furthermore, capability building rarely occurs in isolation and involves active cooperation between firms, buyers of output and support institutions for technology and export marketing. Buyers of output have been especially helpful in supporting the firm-level learning in consumer goods industries like textiles and clothing by providing marketing advice and technical knowledge (Rhee, 1990; Keesing and Lall, 1992). Hence, differences in the efficiency with which firm-level capabilities are created are themselves a major source of competitive advantage.

It is challenging, however, to measure inter-firm differences in technological capabilities in developing countries. In the last decade or so, studies have begun to develop a simple summary measure of technological capabilities by ranking the technical functions performed by enterprises (see the pioneering work on Thailand by Westphal et al., 1990).² The ranking procedure integrates objective and subjective information into measures of a firm's capacity to set up, operate and transfer technology. The typical approach is to highlight the various technical functions performed by enterprises and to award a score for each activity based on the assessed level of competence in that activity. An overall capability score for a firm is obtained by taking an average of the scores for the different technical functions. As discussed below, the overall capability score (often referred to as a technology index or TI) has proved robust in statistical analysis of export and technological performance.

The increasing availability of large micro-level datasets, particularly for developing countries, has stimulated econometric research at firm-level rather than country or industry-level. This research has sought to test the importance of the theoretical determinants of comparative advantage as well as technological capabilities at firm-level. Multiple regressions (OLS, Tobit, Probit and Heckman selection models) were run relating export behaviour to various enterprise characteristics (including foreign ownership, R&D and technological capabilities, advertising, firm size, skill intensity and capital intensity).

The results from selected studies on China and other developing countries can be highlighted.³ A study by Zhao and Li (1997) tested the

² More recent applications include Pakistan by Romijn (1999), Mauritius by Wignaraja (2002), and China by Guan and Ma (2003).

³ Similar studies include Wilmore (1992) on Brazil, Kumar and Siddharthan (1994) on India, Wignaraja (2002) on Mauritius, Bhaduri and Ray (2004) on India, and Rasiah (2006) on South Africa.

relationship between R&D and export propensity in manufacturing firms in China and found R&D and firm size to be positive and significant determinants. Capital intensity was also significant but with a negative sign. A study of Chinese firms by Guan and Ma (2003) reported that firm-level export performance is positively associated with an index of innovative capability and firm size. More recently, Du and Girma (2007) report that foreign ownership, access to finance and product innovation were found to be positively associated with the propensity to export in firms in China.

In an early study of Indian engineering and chemicals firms, Lall (1986) found evidence for technological determinants of enterprise exporting. Foreign equity was found to be significant in chemicals, licences were highly significant in engineering, and R&D was significant in both industries (but with opposite signs). Rasiah (2003) examined the influence of ownership, R&D expenditure, age and skills in determining exports in electronics firms in Malaysia and Thailand. All four variables had positive signs and were significant. Correa et al. (2007) report that R&D, firm size and foreign ownership are positively associated with exporting behaviour in firms in Ecuador. Finally, Wignaraja (2008) found that geographical location, human capital, size, ownership and a technology index were significant and positively associated with firm-level export performance in Sri Lanka. Thus, econometric studies have generally confirmed the importance of the theoretical determinants of comparative advantage as well as technological capabilities at firm-level in developing countries.

2.2 Hypotheses

Building on the econometric literature on firm-level exporting discussed above, this paper estimates separate functions on the probability of exporting for clothing firms in China and Sri Lanka:

$$Y = \beta X + \varepsilon, \quad (1)$$

where Y is the vector denoting the probability of exporting at firm-level, X is the matrix of explanatory variables, β is the matrix of coefficients, and ε is the matrix of error terms. The dependent variable of the model, Y , is a binary variable taking the value of one if the firm is an exporter and zero if the firm is a non-exporter.

The hypotheses and explanatory variables in X in equation (1) are described below.

Foreign ownership

From existing empirical studies, the share of foreign equity (FOR) is expected to have a positive influence on the probability of exporting (Lall, 1986; Wilmore, 1992; Rasiah, 2003; Correa et al., 2007; Du and Girma, 2007). There are two a priori reasons. First, access to the marketing connections and know-how of their parent companies as well as accumulated learning experience of producing for export make foreign affiliates better placed to tap international markets than domestic firms.⁴ Second, foreign firms tend to be larger than domestic firms and therefore better placed to reap economies of scale in production, R&D and marketing. A large firm will be better able to exploit such scale economies and enjoy greater efficiency in production, enabling it to export more.

Technological capabilities

We expect technological capabilities to be positively associated with the probability of exporting. Case studies and econometric work indicates that the learning process in enterprises is not just a simple function of years of production experience but of more conscious investments in creating skills and information to operate imported technological efficiently (see Westphal et al., 1990; Ernst et al., 1998; Rasiah, 2003, 2006; Wignaraja, 2002, 2008; Guan and Ma, 2003). Such investments would include search, training and engineering activities. In the tradition of Westphal et al. (1990), a firm-level technology index (TI) has been developed to represent technological capabilities. The TI used here is a simple production capability based variant of indices based on the Lall (1992) taxonomy of technological capabilities. It was constructed by ranking a clothing firm's competence across a series of technical functions and the results were normalized to give a value between 0 and 1 (see appendix 1 for details of the TI).

Foreign buyers

Marketing and information links, and associated learning processes are an under-studied area in the econometric literature on firm-level exporting. New developing country export firms in consumer goods industries rarely engage in independent export marketing efforts including advertising. Instead, case studies suggest that they typically

⁴ See Dunning (1993) for a discussion of the ownership advantages of transnationals.

manufacture to orders from buyers from industrial countries (see Rhee, 1990; Keesing and Lall, 1992). Buyers' help (or that of technical consultants) is indispensable in showing new and potential exporters how to meet the price, quality and delivery requirements of demanding export markets. Equipment and technical assistance are frequently provided by buyers to purchase new equipment and improve technological capabilities (including quality management, control inventory and product designs). Accordingly, the presence of a marketing relationship with a leading buyer of output is considered to be positively associated with the probability of exporting. A dummy variable (BUYER) – which takes a value of 1 when a marketing relationship with a buyer is present – is used to represent such a relationship.

Age

As firms with experience are regarded as enjoying greater experimental and tacit knowledge, age is considered to be positively associated with the probability of exporting and the building capabilities (Rasiah, 2003). Age is represented by the absolute age of the firm in number of years (AGE).

Capital

For capital-poor developing countries, the Heckscher-Ohlin trade theory predicts a negative relationship between capital intensity and exports and a positive relationship between capital intensity and imports. Some econometric studies (e.g. Wilmore, 1992; Zhao and Li, 1997) have confirmed the predicted negative relationship between capital intensity and the probability of exporting at firm-level. Accordingly, trade theory may be useful in predicting whether or not a firm will export. Capital is difficult to measure and the proxy used by empirical studies depends on data availability. Capital is represented by fixed assets capital per employee (CAP).

Skill Adjusted Wages

In skill-poor developing countries, the Heckscher-Ohlin trade theory predicts a negative sign for skill intensity in export functions and empirical evidence at firm-level verifies this prediction (Wilmore, 1992; Bhavani and Tendulkar, 2001). Skill intensity is represented by

skill adjusted wages (WAGE).⁵ For a given level of material intensity, the lower the wage share, the lower is the (skill adjusted) wage rate in relation to labour productivity, the more likely a firm has a comparative advantage in exporting. Thus, skill adjusted wages are expected to have, *ceteris paribus*, a negative association with the probability of exporting.

3. Data and empirical findings

3.1 Data and t-test

The data used come from the World Bank Investment Climate Surveys, conducted in 2003 for China and 2004 for Sri Lanka.⁶ These surveys provide a representative sample of the population of clothing firms in both countries by selecting firms on a largely random basis using a stratified simple random sample design. Summary descriptive statistics for 353 clothing firms in China and 205 firms in Sri Lanka are provided in table A1. The Chinese sample includes 59 foreign-owned firms while the Sri Lankan sample includes 47 foreign-owned firms. Apart from ownership, these samples cover a wide range of market-orientation, size, age groups and technology levels.

Table 1 reports t-test results on mean values for a variety of firm characteristics. The comparison considers clothing exporters and non-exporters. Exporters are defined as continuing and new exporters in China in 2003 and Sri Lanka in 2004. Non-exporters are defined as the rest of the firms.

There is a significant difference in foreign equity between exporters and non-exporters in China and Sri Lanka. This is probably the most striking difference between exporters and non-exporters. On average, exporters in China have 4.8 times more foreign equity than non-exporters while exporters in Sri Lanka have 6.1 times more foreign equity.

⁵ Bhavani and Tendulkar (2001), among others, argue that it is not just cheap labour (a low wage rate per worker) that results in a comparative cost advantage but a low wage in relation to productivity of that labour. The skill adjusted wage rate in relation to productivity at firm-level is defined as follows: $W/S = (W/E) / (S/E)$ where W = the wage bill, S = value of sales and E = number of employees.

⁶ Private contractors conduct these surveys on behalf of the World Bank. The Sri Lanka survey was conducted in collaboration with the Asian Development Bank. See www.enterprisesurveys.org for details of the China and Sri Lanka surveys.

Technology differences (as indicated by the technology index, TI) between exporters and non-exporters are also significant in both countries. Interestingly, the TI gap between Chinese exporters and non-exporters is somewhat narrower than that between Sri Lankan exporters and non-exporters. The value of TI for Chinese exporters is 0.47 compared with 0.43 for non-exporters. Meanwhile, the TI value for Sri Lankan exporters is 0.50 compared with 0.40 for non-exporters.

Table 1. Mean characteristics of clothing exporters and non-exporters in China in 2003 and Sri Lanka in 2004

Characteristics	China			Sri Lanka		
	Exporters (n=130)	Non-Exporters (n=223)	t-values	Exporters (n=119)	Non-Exporters (n=86)	t-values
Foreign equity, %	22.91	4.80	6.02***	28.77	4.72	4.85***
Technology Index (0 to 1)	0.47	0.43	2.13**	0.50	0.40	3.17***
Age of firm, number of years	12.83	16.79	-2.64***	16.99	23.18	-2.80***
Capacity utilization, %	82.12	69.43	4.81***	80.40	70.41	3.91***
Fixed assets per employee, US\$	4.63	8.83	-0.84	2.91	3.10	-0.14
Wage bill, % sales	12.22	23.60	-4.00***	25.34	50.65	-4.67***
No. of permanent employees	471	245	3.38***	683	96	5.81***

Source: author's analysis.

t-values for two-sample t test with equal variance: mean(exporter) – mean(non-exporters); *** significant at 1% level, ** at 5% level, and * at 10% level.

Exporters are younger than non-exporters in both countries. The average age for an exporter in China is just under 13 years while that for a Sri Lankan exporter is 17 years. Non-exporters are 16.8 years and 23.2 years, respectively.

Looking at capacity utilization, once again we observe significant differences between exporters and non-exporters. Capacity utilization levels in exporters are at least 10 percentage points higher than non-exporters in both countries.

The wage bill as a percentage of sales and firm size are two additional characteristics that differ between exporters and non-exporters.

The Chinese and Sri Lankan samples reproduce some of the stylized facts reported by the literature on exporting. The stylized facts are consistent with the studies reported in section 2. By applying the t-tests, which are a useful descriptive device, we can establish that exporters have higher foreign ownership, are technologically more sophisticated and have higher capacity utilization levels. These differences alone do

not shed much light on causation. Hence, we develop a regression model below.

3.2 Econometric analysis

A general to specific modelling approach was adopted for econometric testing. Initially, the general model (with all the explanatory variables mentioned in section 2) was estimated. Then a specific model or reduced form was estimated with only the significant variables. Table 2 shows the estimated Probit models. Estimated equations (1) and (3) report the general models for Chinese and Sri Lankan firms while equations (2) and (4) show the reduced form models with only the significant variables.

The results of equation (2) for Chinese clothing firms can be considered following diagnostic testing.⁷ The pseudo R^2 in equation (2) is acceptable for a cross-section model. Of the six original independent variables in equation (1), five are significant (three at the 1% level) and have the expected sign.

The findings underline the critical link between three complementary factors and the probability of exporting in clothing firms in China. First, FOR is positive and significant (1% level) which indicates that foreign ownership is associated with the probability of exporting in Chinese firms. The explanation seems to lie in a combination of access to marketing connections and know-how of their parent companies, accumulated learning experience of producing for export, and economies of scale linked to firm size. Second, TI is significant (10% level) and positive. This emphasizes that investments in creating the requisite technological capabilities to operate imported technology efficiently is linked to the probability of exporting. Third, BUYER is significant (1% level) and with the correct sign. This suggests that a marketing relationship with a foreign buyer of output increases the probability of exporting at firm-level. Finally, the control variables suggested by trade theory – CAP (at the 10% level) and WAGE (1% level) are also significant and with the expected negative sign. Accordingly, the predictions of the Heckscher-Ohlin trade theory receive support from firm level analysis in the case of China.

⁷ Since the dataset contains firms of all sizes, different ownership structure, export orientation, among others, the Probit estimation used the robust standard errors to account for mild heteroskedasticity that is expected in the dataset. Furthermore, correlation analysis indicated no large correlations between any of the independent variables.

The results for the Sri Lankan clothing firms are similar, indicating that certain factors are closely associated with the probability of exporting at firm level. The pseudo R^2 in equation (4) is better than equation (2) and four of the independent variables are significant in the reduced form equation. The three complementary factors are significant and with the correct sign. While TI is significant at the 10% level, FOR and BUYER are significant at the 1% level. Furthermore, WAGE has the expected negative sign and is also significant (5% level).

Table 2. Probit estimates of export behavior of garments firm
Binary Variable: Exporter (1) and Non-exporter (0)

Independent Variables	China		Sri Lanka	
	(1)	(2)	(3)	(4)
FOR	0.0158 (5.29)***	0.0158 (5.37)***	0.0103 (2.75)***	0.0103 (2.71)***
TI	0.7942 (1.82)*	0.7958 (1.82)*	1.0175 (1.92)*	0.9572 (1.91)*
BUYER	0.5224 (2.61)***	0.5223 (2.61)***	1.4547 (5.81)***	1.5533 (6.48)***
AGE	-0.0010 (-0.15)		-0.0057 (-0.93)	
CAP	-0.0070 (-1.92)*	-0.0070 (-1.92)*	-0.0000 (-0.17)	
WAGE	-0.0263 (-4.76)***	-0.0265 (-4.90)***	-0.0127 (-2.25)**	-1.3140 (-2.40)**
Constant	-0.7169 (-2.50)**	-0.7297 (-2.62)***	-0.5417 (-1.56)	-0.6436 (-2.17)**
<i>n</i>	314	314	171	180
<i>Wald χ^2</i>	62.86***	62.88***	54.59***	57.28***
<i>Pseudo R²</i>	0.17	0.17	0.38	0.39
<i>Log pseudo likelihood</i>	-172.09	-172.11	-70.93	-73.57

Source: author's analysis.

z values are in parentheses; *** significant at 1% level, ** at 5% level, and * at 10% level.
Coefficients were estimated using robust standard errors.

4. Conclusion

The paper uses a rich microeconomic dataset to explore the determinants of a firm's decision of whether or not to export in clothing

firms in China and Sri Lanka. It emphasizes that several factors must be taken into account to explain the decision to export at firm level. Firm-level export functions were estimated using a Probit model for Chinese and Sri Lankan clothing firms with proxies for foreign ownership, technological capabilities, learning from buyers and standard control variables (capital intensity, skill adjusted wages and firm age). As a part of the exploratory data analysis, t-tests were also conducted on exporters and non-exporters. Another interesting aspect of the research was the inclusion of a technology index to represent technological capabilities and a dummy variable to capture learning from buyers. To the best of our knowledge, this is one of the first econometric studies to test the influence of these two variables along with foreign ownership and other control variables.

The econometric results indicate that foreign ownership, the acquisition of technological capabilities and learning from buyers are positive and significantly correlated with the probability of exporting in clothing firms in China and Sri Lanka. The role of technological and marketing factors in the decision to export at firm-level is thus underlined by the econometric results. First, access to the marketing connections and know-how of parent companies as well as accumulated experience of production makes foreign affiliates better placed to tap international markets than local firms. Second, conscious investments in skills and information to use imported technologies efficiently give firms a competitive advantage in exporting. Third, buyers help is indispensable in showing potential exporters how to meet the demanding requirements of export markets.

Furthermore, skill adjusted wages – a control variable suggested by trade theory – is significant and with the expected negative sign in both Chinese and Sri Lankan firms. Meanwhile, fixed assets per employee (a proxy for capital intensity) has a negative correlation with the probability of exporting in China but not in Sri Lanka. These last two results indicate that the predictions of the Heckscher-Ohlin trade theory also receive some support at firm-level in China and Sri Lanka.

Comparative econometric research on firm-level exporting behaviour using large samples is a relatively new development in the literature, stimulated by the availability of large enterprise survey datasets and methodological developments (e.g. the technology index). Nonetheless, as this paper and others highlight, it provides a powerful means to verify and extend the findings of detailed enterprise case studies on innovation and learning processes in developing countries.

Appendix 1. The Technology Index (TI) for Chinese and Sri Lankan firms

The Lall (1992) taxonomy of technological capabilities provides a comprehensive matrix of technical functions required for a developing country firm to set up, operate and transfer imported technology efficiently. Lall groups these functions under the three sets of capabilities - investment, production and linkages. The Lall taxonomy of technological capabilities has been successfully used by case study research to assess levels of firm-level technological development in developing countries (for a selection see Lall, 1987; Lall and Wignaraja, 1998; Wignaraja, 1998; Romijn, 1999). Subsequently, a technology index based on the Lall taxonomy (or its variants) has been developed for econometric testing of the relationship between technological capabilities and exports in several developing countries (see, for instance, Westphal et al., 1990; Romijn, 1999; Wignaraja 1998, 2002, 2008).

The application of the Lall (1992) taxonomy in this study was influenced by data availability on technical firms performed by firms in the 2003 Investment Climate Surveys of China and Sri Lanka. Five technical functions were common to both the Chinese and Sri Lankan samples. Hence, the TI used here was based on firms' competence in the following – (i) search for technology, (ii) ISO quality certification, (iii) process adaptation, (iv) minor adaptation of products, and (v) introduction of new products. A firm is given a score of 1 for each technical function it undertakes and the result is normalized to give a value between 0 and 1. This figure can be interpreted as the overall capability score for a firm.

Table A1. Summary descriptive statistics for clothing firms in China and Sri Lanka

Characteristics	China			Sri Lanka		
	<i>obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>obs</i>	<i>Mean</i>	<i>Std. Dev.</i>
Exports to sales ratio, %	350	27.89	41.89	205	49.51	46.89
Fixed assets per employee, US\$	351	7.27	45.07	195	2.98	9.00
Wage bill, % sales	315	19.30	25.01	194	35.22	38.59
No. of years since establishment	253	15.33	13.68	218	19.38	15.63
Foreign equity, %	353	11.47	28.55	218	18.89	36.89
Technology Index (0 to 1)	353	0.45	0.17	204	0.45	0.22
No. of permanent employees	352	328	614	204	435	764

Source: author's analysis.

References

- Bleaney, M. and K. Wakelin (2002). "Efficiency, innovation and exports", *Oxford Bulletin of Economics and Statistics*, 64(3), pp. 3–15.
- Bhaduri, S. and A. Ray (2004). "Exporting through technological capability: econometric evidence from India's pharmaceutical and electrical/electronics firms", *Oxford Development Studies*, 32(1), pp. 87–100.
- Bhavani, T.A. and Suresh D. Tendulkar (2001). "Determinants of firm-level export performance: a case study of Indian textile garments and apparel industry", *Journal of International Trade & Economic Development*, 10(1), pp. 65–92.
- Correa, P., M. Dayoub and M. Francisco (2007). "Identifying supply-side constraints to export performance in Ecuador: an exercise with investment climate survey data", *World Bank Policy Research Working Paper*, 4179, March.
- Deardorff, A. (2005). "How robust is comparative advantage", *Review of International Economics*, 13, pp. 1004–1016.
- Du, J. and S. Girma (2007). "Finance and firm export in China", *Kyklos*, 60(1), pp. 37–54.
- Dunning, J.H. (1993). *Multinational Enterprises and the Global Economy*, Wokingham, United Kingdom: Addison-Wesley.
- Ernst, D, T. Ganiatsos and L. Mytelka (eds.) (1998). *Technological Capabilities and Export Success in Asia*, London: Routledge.
- Greenaway, D. and R. Kneller (2007). "Firm heterogeneity, exporting and foreign direct investment", *Economic Journal*, 117, 134–161.
- Guan, J. and N. Ma (2003). "Innovative capability and export performance of Chinese firms", *Technovation*, 23(9), pp. 737–747.
- Ito, K. and V. Pucik (1993). "R&D spending, domestic competition and export performance of Japanese manufacturing firms", *Strategic Management Journal*, 14, pp. 61–75.
- Keesing, D.B. and S. Lall. (1992). "Marketing manufactured exports from developing countries: learning sequences and public support", in G.K. Helleiner, ed., *Trade Policy, Industrialization and Development: New Perspectives*, Oxford: Clarendon Press.
- Kumar, N. and N.S. Siddharthan (1994). "Technology, firm size and export behaviour in developing countries: the case of Indian enterprises", *Journal of Development Studies*, 31(2), pp. 289–309.
- Lall, S. (1986). "Technological development and export performance in LDCs: leading engineering and chemical firms in India", *Weltwirtschaftliches Archiv*, 122(1), pp. 80–91.
- Lall, S. (1987). *Learning to Industrialize*, Basingstoke, United Kingdom: Macmillan.

-
- Lall, S. (1992). "Technological capabilities and industrialization", *World Development*, 20, pp. 165–86
- Lall, S. and G. Wignaraja (1998). "Mauritius: dynamising export competitiveness", *Commonwealth Economic Paper*, No 33, London: Commonwealth Secretariat.
- Mathews, J.A and D. Cho (2002). *Tiger Technology: The Creation of a Semiconductor Industry in East Asia*, Cambridge: Cambridge University Press.
- Nelson, R.R (2008). "Economic development from the perspective of evolutionary economic theory", *Oxford Development Studies*, 36(1), pp. 9–21.
- Rasiah, R. (2003). "Foreign ownership, technology and electronics exports from Malaysia and Thailand", *Journal of Asian Economics*, 14, pp. 785–811.
- Rasiah, R. (2004). *Foreign Firms, Technological Intensities and Economic Performance: Evidence from Africa, Asia and Latin America*, Cheltenham: Edward Elgar.
- Rasiah, R. (2006). "Ownership, technological intensities and economic performance in South Africa", *International Journal of Technology Management*, 36(1/2/3), pp. 166–189.
- Rhee, Y.W. (1990). "The catalyst model of development: lessons from Bangladesh's success with garment exports", *World Development*, 18(2), pp.333–346.
- Romijn, H. (1999). *Acquisition of Technological Capability in Small Firms in Developing Countries*, Basingstoke, United Kingdom: Macmillan Press.
- Westphal, L.E., K. Kritayakirana, K. Petchsuwan, H. Sutabutr and Y. Yuthavong (1990). "The development of technological capability in manufacturing: a macroscopic approach to policy research", in R.E. Evenson and G. Ranis, eds., *Science and Technology: Lessons for Development Policy*, London: Intermediate Technology Publications.
- Wignaraja, G. (1998). *Trade Liberalization in Sri Lanka: Exports, Technology and Industrial Policy*, London: Macmillan Press, and New York: St. Martins Press.
- Wignaraja, G. (2002). "Firm size, technological capabilities and market-oriented policies in Mauritius", *Oxford Development Studies*, 30(1), pp. 87–104.
- Wignaraja, G. (2008). "Foreign ownership, technological capabilities and clothing exports in Sri Lanka", *Journal of Asian Economics*, 19, 29–39.
- Wilmore, L. (1992). "Transnationals and foreign trade: evidence from Brazil", *Journal of Development Studies*, 28(2), pp. 314–335.
- World Bank (2008). Enterprise Surveys, www.enterprisesurveys.org
- Zhao, H. and H. Li (1997). "R&D and export: an empirical analysis of Chinese manufacturing firms", *Journal of High Technology Management Research*, 8(1), pp. 89–105.

