Foreign Ownership, Technological Capabilities, and Clothing Exports in Sri Lanka

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Abstract

Drawing on recent developments in applied international trade and innovation and learning in developing countries, this paper examines the links between firm-level export performance, foreign ownership, and the acquisition of technological capabilities in a sample of 205 clothing enterprises in Sri Lanka. Econometric analysis indicates that foreign ownership, firm size, human capital, technological capabilities, and geographical location are all positively associated with export shares. Furthermore, higher levels of technological capability are associated with larger firm size, university-level manpower, and R&D. Micro-level investigations are a complementary input to developing policies for promoting private sector competitiveness in outward-oriented developing countries.

JEL Classification: F14, O31, L67

Contents

1. INTRODUCTION

Increasing attention is focusing on the study of the behavior of export firms in developing countries, drawing on the literature of applied international trade and that on innovation and learning. One of the fastest growing strands of literature has focused on the relationship between firm-level export performance, foreign ownership, and the acquisition of technological capabilities. This literature has been empirically led through case studies and econometric analysis, with contributions including Lall (1986, 1987) on India, Kumar and Siddharthan (1994) on India, Bhaduri and Ray (2004) on India, Wilmore (1992) on Brazil, Pietrobelli (1997) on Chile, Westphal et al. (1990) on Thailand, Ernst et al. (1998) on East Asia, Rasiah (2003, 2006) on Malaysia and South Africa, Deraniyagala and Semboja (1999 on Tanzania, Wignaraja (1998, 2002) on Sri Lanka and Mauritius, and Rasiah (2004) on Africa, Asia, and Latin America.

Sri Lanka—South Asia's earliest reformer—is an interesting example of a developing country that has pursued an outward-oriented foreign direct investment (FDI) strategy since 1977 to expand exports. The more liberal FDI regime[1] stimulated the entry of foreign firms and clothing exports rapidly grew (amounting to 66% of manufactured exports in 2000–2005). Empirical studies on the clothing industry, largely at the macro and sectoral levels, have focused on trends and determinants of FDI inflows in Sri Lanka.[2] Few studies, however, have attempted to examine the links between exports, ownership, and technological activity at the firm level in the Sri Lankan clothing industry. A lack of firm-level data and the need for costly firm surveys have hampered investigation of these issues. The handful of case studies of clothing firms and small sample econometric analysis highlight two findings: (a) foreign firms are better exporters than domestic firms; and (b) technological capabilities and human capital approaching international best practice levels are important determinants of export advantage (Lall and Wignaraja, 1995; Wignaraja, 1998; Deraniyagala, 2001; Chandrasiri, 2003; and Knutsen, 2004). These preliminary yet striking findings require empirical verification and further analysis using larger samples of firms. Such a study can also contribute to policy debates in Sri Lanka (and elsewhere in the developing world) over the role of ownership in the clothing industry in a post-MFA context and appropriate investment policies.

Building on the literature on firm-level exports and technological capabilities in developing countries, this paper examines characteristics besides foreign ownership that influence a firm's export behavior (including technological capabilities, human capital, size, and geographical location). As a proxy for technological capabilities, the paper considers a simplified technology index based on five technical functions performed by firms. It also analyzes the determinants of the technology index (e.g., firm size, age, share of professional workers, training, and R&D). The sample used here is a large one (205 clothing firms) and the survey was conducted in 2004. Section 2 reviews the relevant recent literature. Section 3 presents the data and econometric results. Section 4 concludes the paper.

[1] Sri Lanka's 1977 economic reform program had measures to create a liberal FDI regime: liberalization of foreign investment laws, tax holidays on profits and salaries, duty-free access to imported inputs and the setting up the Katunayake Investment Processing Zone (Ganeshamoorthy, 2002). The clothing industry saw a twenty-two fold increase in annual FDI inflows from $12 million in 1987-89 to over $270 million in 2000-2005.

[2] Empirical studies on clothing, largely at the macro and sectoral levels, have focused on the trends and determinants of FDI inflows. For a selection see Lakshman (1989), FIAS (1993), Kelegama and Foley (1999), Athukorala and Rajapathirana (2000), and UNCTAD (2004). The entry of export-oriented FDI into Sri Lankan clothing is attributed to: a strategic geographical location, access to multi-fibre agreement (MFA) quotas, attractive investment incentives, and ample supplies of low cost, trainable labor. Locational disadvantages are said to include: political instability, poor quality infrastructure, and weak sub-contractors/suppliers to MNCs.

2. STUDIES ON FIRM-LEVEL EXPORTS AND TECHNOLOGICAL CAPABILITIES

There is growing interest within the literature on applied international trade and that on innovation and learning on the study of the export behavior of enterprises in developing countries. Key aspects of the theoretical literature and selected empirical studies are surveyed below.

The analysis of export performance of firms in developing countries—which has roots in the neo-Heckscher-Ohlin model and the neotechnology theories—is a relatively recent development in the applied international trade literature. This literature suggests that the theoretical determinants of comparative advantage, which are traditionally recognized as industry-level factors,[3] can also operate at the firm level (see, for instance, Lall, 1986; Kumar and Siddharthan, 1994; Bhaduri and Ray, 2004). 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 the 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.

a) There are country-specific and industry-specific advantages which apply to all firms equally.

b) 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.

A related strand of literature, drawing on innovation and learning processes in developing countries, emphasises the acquisition of technological capabilities as a major source of export advantage at the firm level (see Lall, 1992; Bell and Pavitt, 1993; Pietrobelli, 1997; Ernst et al., 1998; Rasiah, 2004). This literature underlies the difficult firm-specific processes involved in building technological capabilities to use imported technology efficiently. The 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 and support institutions for technology and export marketing. 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). 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

[3] The major trade theories (the Heckscher-Ohlin model, theories of economies of scale and oligopolistic competition, neotechnology theories, and theories of economic geography) attribute the export performance of a small open developing economy (e.g., Sri Lanka) to its comparative advantage over another in terms of access to certain factor inputs—capital, labor, economies of scale, technology, and geography (for surveys see Wakelin, 1997; Deardorff, 2005). Empirical applications to developing countries have sought to explain the export performance of each industry/product in terms of their various characteristics.

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 available empirical studies have generally confirmed the importance of the theoretical determinants of comparative advantage at the firm level in developing countries. Multiple OLS or Tobit regressions were run relating export achievements to particular enterprise characteristics (including capital intensity, skill intensity, advertising, firm size, foreign ownership, R&D, and technological capabilities).

Representative econometric studies on firm-level export performance in Latin America, Asia, and Africa can be highlighted. Wilmore (1992) tested the hypothesis that foreign ownership had a positive effect on exports across Brazilian firms. He found that foreign ownership was highly significant (at the 1% level) and positive in sign while firm size and advertising were also significant and positive. More recently, Rasiah (2003) examined the hypothesis that foreign firms are endowed with higher export and technological capabilities than local firms, focusing on electronics firms in Malaysia and Thailand. The positive sign and significance of a foreign ownership dummy, R&D expenditure, and skills confirmed the hypothesis.

In a 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 (1% level), and R&D was significant in both industries (but with opposite signs). Likewise, Bhaduri and Ray (2004) reported that technological capability, R&D effort, and firm size were determinants in Indian pharmaceutical and electrical/electronics firms. A foreign ownership dummy was positive and significant (10% level) in pharmaceuticals indicating that foreign firms are better exporters than domestic firms. Wignaraja (1998) found that skills (average wage) and technology (share of quality control manpower in employment) influenced firm-level exporting in Sri Lankan clothing and engineering firms. In a study of Mauritian clothing firms, Wignaraja (2002) found that foreign equity and technological capabilities were statistically significant (1% level) and positively associated with firm-level export performance.

Meanwhile, cross-section econometric work on the determinants (e.g., firm size, market orientation, foreign equity, entrepreneur's education, technical manpower, and training) of a TI has yielded some interesting results. Westphal et al. (1990) examined the determinants of different TI's in Thai electronics, biotechnology, and materials technology enterprises. In a regression of a production TI, they found that firm size was significant (10% level) and positive. Romijn (1999) used TI's based on the manufacturing complexity of products on engineering firms in Pakistan. In her best two regressions, firm size was significant (1% level) and positive. Search for information, external technical assistance, and improvements made to products are also all significant and positive. Finally, in a study of factors affecting TI's in Kenyan garment and engineering enterprises, Wignaraja and Ikiara (1999) reported that firm size, foreign equity, and entrepreneur's education were all significant (5% level) and positive.

The above studies also indicate that firm-level export performance (and technological capability building) in developing countries is affected by national policy and institutional factors. The list of possible policy and institutional factors is quite long and their interactions are often complex. In general, an outward-oriented development strategy, a conducive investment climate, investment in technical skills, and supportive science and technology institutions are among the key factors which encourage firm-level export and technological performance.

3. T-TEST AND ECONOMETRIC RESULTS

3.1 Data and T-test Results

The study uses data from the Asian Development Bank/World Bank (ADB/WB) investment climate survey of urban and rural enterprises in Sri Lanka conducted in 2004 (see ADB/WB, 2005). The ADB/WB survey selected firms on a largely random basis using a stratified simple random sample design. The cross-section data on 205 clothing firms are for the 2003–2004 period. The sample includes 47 foreign-owned and 158 domestic enterprises, which cover a range of market orientation, size classes, and locations in Sri Lanka.

Table 1 shows the results of T-tests comparing the means of some characteristics of the foreign and domestic clothing firms (including export shares, capacity utilization rates, firm size, age of the firm, replacement cost of capital, imported equipment ratios, CEO education and experience, and share of foreign employees).

Table 1: T-tests of Differences of Means of Foreign and Domestic Clothing Firms[/a]

	Foreign	Domestic	t-value*
Share of exports in sales (%)	81.11	40.75	4.88
Number of permanent employees	1,060	259	6.21
New imported equipment (% of equipment)	47.09	24.45	2.85
Replacement cost of capital ('000 Rupee)	200,906	37,465	6.55
Education level of CEO[/b]	5.15	3.52	4.56
Years of export experience of CEO	16.02	9.12	4.45

*All differences in means are significant at 1% level.
/a Conducted on 47 foreign firms and 158 domestic firms.
/b Measured discretely by a scoring system of seven categories ranging from below secondary schooling (1) to post-graduate degree (7).

The following conclusions may be drawn:

- Foreign firms record better performance than domestic firms. There is a significant difference between the exports-to-sales ratios of the two groups. Sales to export markets account for more than 80 percent of total sales of foreign firms while they only make up about 40 percent for domestic firms.
- Foreign firms are larger in terms of the number of workers employed. On average, foreign firms have 1,060 permanent employees while domestic firms have 259 permanent employees.
- Foreign firms invest more in modern equipment than domestic firms. The means of the replacement value of capital and the shares of new equipment in total equipment are significantly higher in foreign firms than in domestic ones. Almost half of the imported equipment of foreign firms is new while the proportion is only a quarter for domestic firms.
- Foreign firms have better human capital than domestic firms. This is indicated by significant differences in the means of the educational attainment of the CEO, and the years of export experience of the CEO. For instance, the means for the level of educational attainment of the CEO are 5.02 and 3.53, respectively, for foreign and domestic firms (where 5 indicates a completed university-level undergraduate degree and 3 only vocational qualifications).[4]

[4] The share of skilled production workers and the average wage, however, do not show up as significantly different between the two groups.

3.2 Factors Affecting Firm-level Export Performance

A firm-level export function was estimated for Sri Lankan clothing firms using a Tobit model.[5] The dependent variable is the export-to-sales ratio (EXSH). The full linear model is as follows:

EXSH = *f* (RVE, WAGE, SKW, CEOED, CEOEXP, FE, SIZE, TI, LOC)

The hypotheses and independent variables are as follows.

Capital is represented by the replacement value of capital per employee (RVE). Within a given activity, a higher level of physical capital in the form of modern equipment is expected to give a firm a competitive advantage. Thus, RVE is expected to be positively associated with export performance.

Human capital is captured by four variables: the skill adjusted wage rate (WAGE) ,[6] the share of skilled workers in employment (SKW), the level of education of the chief executive officer (CEOED),[7] and the years of experience of the chief executive officer (CEOEXP). Given the same set of skills, a lower wage in relation to productivity per worker is associated with greater firm-level competitive advantage and exporting. Furthermore, within a given activity, a higher level of human capital is likely to give a firm a competitive export advantage and is expected to have a positive effect on export performance. In this regard, different levels of human capital—the share of skilled workers as well as the chief executive's educational attainment and experience of exporting activity—are all likely to be important.

Foreign ownership, the share of foreign equity (FE), is expected to have a positive influence on export performance. 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 (see Dunning, 1993 for a discussion of the ownership advantages of multinationals). Furthermore, 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.

Firm size (measured by a dummy variable[8]) is expected to have a positive sign because exporting allows large firms, especially in small economies, to exploit economies of scale in production by relieving the disadvantage of the small home market.

Technological capabilities are measured by a firm-level technology index (TI). We expect TI to be positively associated with export performance because the process of acquiring technological capabilities in enterprises is not just a simple function of years of experience.

[5] Of the 205 clothing firms in the survey, 86 have zero export values. One of the problems in the estimation of the determinants of the export ratio is that there may be selectivity bias if we were to include only firms with positive exports. The Tobit model, however, includes all firms, i.e. also those with zero exports. See Maddala (1983) for a discussion of Tobit models.

[6] Owing to data constraints, many studies of firm-level exporting only include factory floor skills, proxied by the average wage. In this study we use a more appropriate measure that takes into account different levels of skills—the skill-adjusted wage rate in relation to productivity. This is defined as follows: W/S = (W/L) / (S/L) where W/S is the share of wages to sales, W/L is the skill-adjusted average wage rate, and S/L is the sales per worker.

[7] This was measured discretely by a scoring system of seven categories ranging from below secondary schooling (1) to post-graduate degree (7). While this variable can be treated as a dummy variable with six values, we treated it as a single variable using it as a scoring system.

[8] Some correlation (0.36) between employment and foreign equity (see Table A1) indicates the possibility of multicollinearity. Hence, firm size was captured by a dummy variable that takes a value of 1 if a firm is large (more than 100 employees) and 0 if a firm is small (equal to or more than 100 employees).

Rather, it requires conscious investments in creating skills and information. Such investments would include search, training, and engineering activities. The TI used here is a simple production capability-based variant of indices developed by Wignaraja for Sri Lanka (1998) and Mauritius (2002). The TI 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.[9] Formal R&D activities are excluded from the TI but are included in the analysis as a determinant of TI (see Section 3.3).

The effect of an *urban location* is captured by a dummy variable (LOC), which takes the value 1 for firms located in and around Colombo and 0 otherwise. Favorably located firms are likely to have lower transport costs to the country's main seaport and benefit from externalities (e.g., ready access to suppliers of raw materials and sub-contractors; marketing and other business services; and government services) compared with more distant firms. Thus, LOC is expected to be positively associated with export performance.

Table 2 shows the estimated Tobit models. Estimated equation (1) presents the general model discussed above and equation (2) the reduced form with only the significant variables. Following testing for multicollinearity and heteroscedasticity, the results of equation (2) are considered.[10] The pseudo R^2 in equation (2) is acceptable for a cross-section model. Of the nine independent variables, six are significant (mostly at the 1% level) and have the expected sign.

Strikingly, FE is significant and positive, which indicates that foreign firms are more successful exporters than domestic firms. The explanation lies 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. The correct sign and significance of SIZE underlines the links between firm size, ownership, and exporting.

TI is significant (at the 10% level) and positive, emphasizing that conscious investments in skills and information to use imported technologies efficiently contributes to export performance. More generally, this finding suggests that domestic technological activity and foreign ownership are complements rather than substitutes in developing export capabilities at firm level.

[9] Drawing on the Lall (1992) taxonomy of technological capabilities, the ranking procedure integrates objective and subjective information into measures of a firm's capacity to set up, operate, and transfer technology. Five technical functions performed by the Sri Lankan clothing firms were highlighted (including search for technology, inventory control, process adaptation, minor adaptation of products, and new product introduction) and a score for each function was awarded based on the assessed level of competence in that function. A firm is ranked out of a total score of 5 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.

[10] A correlation test was used to detect multicollinearity. The correlation matrix of variables in Table A1 shows that no large correlations were noted between any of the independent variables, thus indicating that multicollinearity was not a problem. The Goldfeld-Quandt test revealed an F-statistic of 1.006 with 1% level of significance indicating mild heteroskedasticity in equation (2). To correct for heteroskedasticity for the Tobit model, equation (2) was re-estimated using interval regression, which allows the use of robust option to obtain the Huber-White robust standard errors. The estimated coefficients and their levels of significance using this method turned out to be almost the same as those of the Tobit estimates. Hence, the Tobit estimates were retained for analysis.

Table 2: Estimated Tobit Models (Dependent Variable: EXSH)

Variable	Estimated Equation (1)	Estimated Equation (2)
RVE	-0.008 (-1.00)	
WAGE	-114.159 *** (-3.11)	-112.234 *** (-3.36)
SKW	80.790 ** (2.39)	71.787 ** (2.28)
CEOED	0.550 (0.12)	
CEOEXP	1.163 (1.06)	
FE	0.514 * (1.93)	0.600 ** (2.46)
SIZE	134.675 *** (5.21)	137.397 *** (6.08)
TI	81.503 * (1.79)	72.799 * (1.76)
LOC	56.707 *** (2.88)	59.448 *** (3.23)
Constant	-124.028 *** (-2.91)	-108.158 *** (-3.08)
LR chi^2	122.96 ***	129.50 ***
Pseudo-R^2	0.16	0.15
No. of Observations	169	178

***Significant at 1% level; ** at 5%; * at 10%.
Figures in parentheses are t-values.

Two of variables for human capital (SKW and WAGE) are significant and have the correct signs. Within a given activity, a higher level of human capital in the production and a lower wage rate in relation to productivity give a competitive export advantage. The chief executive's educational attainment (CEOED) and experience (CEOEXP) show no significance.

RVE shows no significance, which may be due to difficulties in measuring the replacement value of capital.

LOC is significant and positive. A location near Colombo provides an export advantage due to lower transport costs to the seaport and the benefits of numerous locational externalities.

3.3 Factors Affecting the Firm-level Technology Index

A firm-level technology function was estimated for the Sri Lankan clothing sample using an OLS model. The dependent variable was the technology index (TI). The full linear model is:

TI = *f* (SIZE, AGE, AGESQRD, PROF, CEOED, TRNG, R&D)

The hypotheses and independent variables are as follows.

Firm size, represented by total employment (SIZE), is expected to have a positive sign. The returns from capability acquisition are higher where a firm has a larger volume of sales to

spread the fixed costs of capability acquisition and larger firms can have more specialized manpower and equipment. As foreign firms tend to be larger than local ones, firm size may also capture the influence of foreign ownership and their ownership advantages.

The *a priori* relationship between *age of firm* (AGE) and TI remains ambiguous. Theoretically a positive relationship with TI may be expected because years of accumulated experience can crudely capture "learning by doing" amongst other things. A negative sign is likely, however, for foreign firms that use superior imported technology and enjoy access to international markets but began operations recently. To test for the presence of a non-linear impact on TI, the square of age of the firm (AGESQRD) was used as well.

Human capital, captured by the share of university-level educated employees (PROF) and the level of education of the chief executive officer (CEOED), is expected to have a positive sign. Better educated chief executives and a larger base of university-educated workers can have a significant influence on technological capabilities through more effective search, engineering, and research activities.

Training (measured by expenditure on employee training as a percentage of sales, TRNG), is expected to have a positive sign. Explicit employee training is crucial during enterprise start-up for creating the requisite capabilities to use new production technologies. As technologies evolve, a continuous process of re-training is needed to supply the technical and managerial skills needed by new process and product innovations.

Research and development (represented by R&D expenditure as a percentage of sales) is expected to be positively related to TI. Efforts to acquire production capability in clothing firms can be supplemented by more formal in-house technological effort by technical manpower directed at new product designs, new fabrics (e.g., synthetics or rubber/cotton mixes), process adaptation, and trouble shooting.

Table 3 shows the estimated OLS model results. Equation (1) is the general model and (2) and (3) are the reduced form models. Following testing for multicollinearity and heteroskedasticity, we consider the results of equation (2).[11] The R^2 in equation (2) is reasonable for a cross-section model. Five of the seven independent variables are significant mostly at the 1% level.

Firm size, university-educated employees, and R&D have a positive and significant relationship with TI. The correct sign on the firm size variable suggests that the different explanations for the firm size effect are valid. It is also likely that firm size may reflect foreign ownership. The positive sign on the university-educated workers variable suggests that higher-level skills are related to building technological capabilities. The positive sign on the R&D variable indicates that formal R&D efforts complement efforts at enhancing production capability.

Age is shown to have a non-linear impact on TI. A plausible explanation for this finding is the fact that foreign-owned firms (with superior technology and market access) began operations recently. Furthermore, with learning by doing, local firms gradually acquire technological capabilities. There may also be a minimum age that has to be reached before a domestic enterprise accumulates the requisite level of technological capabilities for export markets.

[11] The variance inflation factors for the independent variables specified in the fitted model were considerably low, suggesting that multicollinearity was not a problem in equation (2). Some heteroskedasticity was expected to be present in a sample of varied firm sizes and was confirmed using the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity for linear regression models. Accordingly, equation (2) was re-estimated using the robust variance estimator, which corrects for heteroskedasticity, and the results are presented in Table 3.

Meanwhile, the CEO's education level and training expenditure show no significance. Further work is needed to find explanations for these results.

Table 3: Estimated OLS Regressions
(Dependent Variable: Technology Index)

Variable	Estimated Equation (1)	Estimated Equation (2)	Estimated Equation (3)
SIZE	14.736 ***	14.752 ***	15.824 ***
	(3.83)	(4.28)	(4.60)
AGE	-0.400 *	-0.403 *	
	(-1.79)	(-1.83)	
AGESQRD	0.004 ***	0.004 ***	
	(2.69)	(2.70)	
PROF	0.690 ***	0.687 ***	0.666 ***
	(5.96)	(6.58)	(6.70)
CEOED	-0.121		
	(-0.14)		
TRNG	0.712		
	(0.16)		
R&D	8.433 **	8.535 **	9.127 **
	(2.02	(2.09)	(2.13)
Constant	40.493 ***	40.289 ***	34.294 ***
	(8.02)	(9.33)	(12.83)
F-statistic	10.74 ***	15.09 ***	19.89 ***
R^2	0.18	0.17	0.16
No. of Observations	159	159	159

***Significant at 1% level; ** at 5%; * at 10%.
Figures in parentheses are t-values.

4. CONCLUSION

This paper suggests that a range of factors should be taken into account to explain why some firms perform better than others in outward-oriented developing countries like Sri Lanka. It provides econometric evidence from a sample of 205 clothing firms in Sri Lanka on the links between firm-level export performance, foreign ownership, and technological capabilities.

Most strikingly, foreign ownership is positively associated with firm-level export shares in the clothing industry. Hence, the relatively superior exporting behavior of foreign-owned firms (due to access to the ownership advantages of their parent firms, accumulated production experience, and large firm size) is supported by econometric evidence.

The positive signs on the technology index and the human capital variables indicate that building domestic technological capability and investing in human capital also influence export shares. Thus, the results from our large sample econometric study confirm those of previous case studies and small sample econometric analysis of the Sri Lankan clothing industry. In addition, the paper highlights the influence of geography on export behavior, which has not been explored in previous studies on Sri Lanka. A firm located close to Colombo has an export advantage stemming from lower transport costs to the seaport and locational externalities.

The paper also highlights that firm size, university-educated employees affect the technological behavior of Sri Lankan clothing firms. The correct sign on the firm size variable

suggests that different explanations for the firm size effect are valid. It is also likely that firm size may reflect foreign ownership. The positive sign on the university-educated workers variable suggests that higher-level skills are related to building technological capabilities. The positive sign on the R&D variable indicates that formal R&D efforts complement efforts at enhancing production capability.

More generally, the study of Sri Lankan firms shows that micro-level investigations of export performance are a fruitful undertaking as they highlight technology, skills, and other phenomena that drive the creation of competitive export advantage in developing countries (Lall, 1986, 1987, 1992). When combined with other relevant information (on a country's investment climate, skill base, infrastructure, and science and technology institutions), such studies can be a powerful tool for formulating policies for private sector competitiveness in developing economies.

Table A1: Correlation Matrix for Clothing Enterprises in Sri Lanka

	EXSH	RVE	SKW	CEOED	CEOEXP	WAGE	FE	SIZE	TI	LOC
EXSH	1.0000									
RVE	-0.0366	1.0000								
SKW	0.2018	-0.0531	1.0000							
CEOED	0.3753	0.1324	0.0431	1.0000						
CEOEXP	0.2520	0.0938	0.0022	0.1700	1.0000					
WAGE	-0.2718	-0.1334	0.0179	-0.2672	-0.0716	1.0000				
FE	0.3382	-0.0144	0.0515	0.2845	0.3315	-0.1040	1.0000			
SIZE	0.6720	-0.0963	0.1453	0.4695	0.2476	-0.1518	0.3643	1.0000		
TI	0.2748	0.0806	-0.1489	0.2081	0.1016	-0.1070	0.0776	0.3374	1.0000	
LOC	0.2891	-0.0175	0.0402	0.0618	-0.0367	-0.0841	-0.1517	0.2336	0.1416	1.0000

Source: Computed from ADB/WB (2005)

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