Title	FDI and Export Participation of Local Firms in Africa: The Case of the Kenyan Garment Industry
Author(s)	Fukunishi, Takahiro
Citation	IDE Discussion Paper. No. 232. 2010.4
Issue Date	2010-04
URL	http://hdl.handle.net/2344/893
Rights	

INSTITUTE OF DEVELOPING ECONOMIES

IDE Discussion Papers are preliminary materials circulated
to stimulate discussions and critical comments

IDE DISCUSSION PAPER No. 232

FDI and Export Participation of Local Firms in Africa: The Case of the Kenyan Garment Industry

Takahiro FUKUNISHI*

April, 2010

Abstract

FDI in the garment sector has been the single case of large-scale manufacturing investment in African low-income countries since the 1990s. While FDI has triggered the development of local industries in many developing countries, it has not yet been realized in Africa. This paper describes the spillover process in the Kenyan garment industry and investigates the background of local firms' behavior through firm interviews and simulation of expected profits in export market. It shows that credit constraint, rather than absorptive capacity, is a primary source of inactive participation in export opportunity. Only firms which afford additional production facilities without sacrificing stable domestic supply may be motivated to start exporting. However, in comparison with successful Asian exporters, those firms were not as motivated as Asian firms due to the large gap in expected profits.

Keywords: manufacturing exports, FDI spillover, sub-Saharan Africa
JEL classification: O14, F21, O33, L67

---

* Research Fellow, Africa Study Group, Area Studies Center, IDE
(fukunis@ide.go.jp)

The Institute of Developing Economies (IDE) is a semigovernmental, nonpartisan, nonprofit research institute, founded in 1958. The Institute merged with the Japan External Trade Organization (JETRO) on July 1, 1998. The Institute conducts basic and comprehensive studies on economic and related affairs in all developing countries and regions, including Asia, the Middle East, Africa, Latin America, Oceania, and Eastern Europe.

INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO
3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI
CHIBA 261-8545, JAPAN

FDI and Export Participation of Local Firms in Africa: The case of the Kenyan Garment Industry[*]

Takahiro Fukunishi
Institute of Developing Economies

Abstract

FDI in the garment sector has been the single case of large-scale manufacturing investment in African low-income countries since the 1990s. While FDI has triggered the development of local industries in many developing countries, it has not yet been realized in Africa. This paper describes the spillover process in the Kenyan garment industry and investigates the background of local firms' behavior through firm interviews and simulation of expected profits in export market. It shows that credit constraint, rather than absorptive capacity, is a primary source of inactive participation in export opportunity. Only firms which afford additional production facilities without sacrificing stable domestic supply may be motivated to start exporting. However, in comparison with successful Asian exporters, those firms were not as motivated as Asian firms due to the large gap in expected profits.

Key words: FDI spillover, Manufacturing, sub-Saharan Africa
JEL Classification: F21, L67, O33

[*]The author would like to thank the firms for their understanding and cooperation with regards to our survey and interviews. I am also grateful for the research assistance provided by Isabel Munandi and Paul Kamau, and comments to the draft version by Machiko Nissanke and the participants of the "Climbing up the Global Value Chains" project and the internal seminar at Institute of Developing Economies.

1. Introduction

Foreign direct investment (FDI) is regarded as one of the important channels of technology transfer from developed to developing countries. In the literature, it is argued that FDI has advantages over other channels in that foreign affiliates make necessary adjustments to technology and production knowledge to fit with the conditions of a host country, and that knowledge is directly transferred to local firms through transactions, and to local workers through training and work experience (Saggi [2002], Rodriguez-Clare [1996]). It is documented that such transfer has improved productivity and/or induced the export activity of local firms, and has consequently led to the growth of local industries, such as textile, automobile, motor bicycles and electric appliances, in many developing countries (Lall and Urata [2003], UNCTAD [2002], Ernst et al. [1998]). In contrast to the growing developing countries, most of the sub-Saharan African countries have received little manufacturing FDI since the 1980s, except for South Africa and Mauritius; the former hosted FDI in the automobile industry and the latter received garment FDI. The lack of active FDI has been recognized as one of the causes of the prolonged stagnation in the African manufacturing sector (Pack [1993], Lall [1999], Biggs et al. [1995]).

The recent emergence of FDI in the African garment industry has provided an opportunity to examine the impact of FDI on local industries. FDI in the garment sector started to flow into several African countries around the year 2000 due to the commencement of the African Growth and Opportunity Act (AGOA) by the US government, which provides preferential access to the US market to qualified African countries. Foreign affiliates have been located in countries with little exporting experience such as Kenya, Lesotho and Swaziland, and African clothing exports to the US market grew threefold between 1999 and 2004.[1]

Around the world, garment FDI has facilitated local firms' participation in the export market in developing countries, which particularly started exporting garments after the 1980s. The growth of local garment industries in Sri Lanka, Mauritius, Indonesia, Bangladesh and Vietnam was preceded by FDI or deep involvement of foreign firms in East Asia and developed countries (UNCTAD [2002], Ernst et al. [1998], Romer [1992], Rhee and Belot [1989], Lall and Wignaraja [1994]). It is argued that the presence of foreign firms in a host country reduces the fixed costs associated with exporting, such as establishing distribution networks, learning about consumer demand, and building transportation infrastructures (Aitken et al. [1997], Greenway et al. [2004]). Participation in the export market led to rapid growth of the local garment industry, and this has been seen in low-income countries (LICs), where the capacity of firms is poor and government support is not effective.[2] For example, the garment industries in Bangladesh and

[1] UN ComTrade Database.

[2] The relationship between exports and growth of the industry is occasionally argued in light of productivity improvement through exports, yet its evidence is mixed. Some empirical studies support the link between exports and productivity growth through learning-by-exporting, competitiveness pressure and increasing returns to scale (Van Biesebroeck [2005], DeLoecker [2007], Bigsten et al. [2004], Grima, Greenway and Kneller [2004]), while some of them support self-selection explanations (Clerides, Latch and Tybout [1998], Bernard and Jensen [1999], Delgado, Farinas and Ruccino [2003]). However, even without productivity improvement, local firms may experience growth through export participation if high sunk cost rather than their poor productivity hinders access to the export market.

Vietnam, which have become large exporters in the world market, are currently comprised mainly of local firms. Due to simple technology, the adoption of technology and knowledge is relatively easy for local firms in the assembly process of garment production (Lall and Wignaraja [1994], Gereffi and Memedovic [2003]).

In contrast to those LICs, however, the growth of local firms has been quite limited in Africa, with the exception of Mauritius and South Africa. Though one can say that the termination of the Multi-fiber Arrangement (MFA) in 2005 had adversely affected the export decision of local firms, our interview revealed that most of the local firm managers were not aware of the institutional change before 2005. Hence, there may be a structural problem in the African manufacturing sector that retarded the technology transfer from FDI, and the emergence of FDI will not necessarily lead to the development of local industry.

To the author's knowledge, there are no studies investigating the impact of FDI on local manufacturing industry development in Africa, aside from a case within the South African automobile industry. However, the empirical literature on the African manufacturing sector provides some implications. Researchers argue that the poor technical capacity of firms and an unfavorable business environment have generally hindered industrial development (Lall [1999], Collier and Gunning [1999], Bigsten and Soderbom [2005]). Their conclusions imply that the lack of industry-wide FDI impact resulted from a shortage of absorptive capacity of local firms and/or high transaction costs to start exporting, yet the LICs that have succeeded in developing the local garment industry were not necessarily endowed with a better local capacity or a favorable business environment. Before starting to export, Bangladesh had neither a competitive garment industry nor a favorable business environment (Rhee and Belot [1989]), and the business environment in Asian LICs is not generally better than that of the African LICs (Fukunishi [2004]). One of the limitations of the previous firm-level studies is that they do not appropriately compare African firms with those of other regions. Most of the econometric studies on the African manufacturing sector use only African firm data, and thus, comparisons are restricted to areas within sub-Saharan Africa. Some case studies have conducted international comparisons of firms' capacity (Biggs et al. [1995], Lall [1999]), but their comparison with middle-income Asian countries is not suitable in terms of revealing why African countries are lagging behind other LICs.

In this paper, the impact of FDI on the local garment industry is investigated. Considering its important role in technology transfer and local industry development in the other LICs, the investigation is expected to reveal a part of the unknown constraints on the growth of the African manufacturing sector. We specifically focus on the export participation of local garment firms as impact of FDI, given that it is most significant in the LICs.[3] Though the period of opportunity was short (from 2000 to 2004), it was one of few opportunities for the manufacturing sector in the poor African countries to absorb foreign technology and access the export market. The Kenyan garment industry is studies.

After describing the spillover process based on the author's interviews with firms, the behavior of firms

[3] Other forms of spillover include productivity improvement of local firms supplying to the domestic market and of the textile industry (backward linkage). Substantial difference in market demand in quality, quantity, taste and fabrics between developed and developing countries may reduce the chance of spillover to local firms supplying to the domestic market (Lall and Wignaraja [1994]).

is analyzed through an investigation of the local firms' absorptive capacity, credit constraints and incentive to start exports. In the analysis, Kenyan firms are compared with Bangladeshi firms using the latter as a successful case in an LIC that has an equally poor business environment and degree of human capital. Given the lack of census data in Kenya, the information in this paper is mainly original. The survey within the firm was conducted by a team including the author in Kenya and Bangladesh in 2003. The author also conducted interviews with garment firms, industrial associations and the Government in 2005 and 2006 to obtain detailed information.

The fieldwork found that a few local exporters had emerged after 2000 despite offers for subcontracting by FDI firms to many local firms. Most local exporters were established by entrepreneurs without previous experience in the garment sector, and the technology and knowledge necessary for export was transferred through expatriates who moved from foreign affiliates to local exporters. Subcontract transactions with FDI firms waived local exporters from logistics and marketing, and hence, expatriates' knowledge was sufficient for local firms to start exporting and become as productive as foreign exporters.

In contrast, credit access constrained the export participation of many local firms. Based on firms' credit access and simulation of the minimum capital size for export, 71.8% of local firms in our sample were found to be financially infeasible (Type 1 firm). Among the rest, most firms were estimated to prepare capital by giving up domestic supply (Type 2 firm), while only 7.7% of them were able to finance an additional production site for the export market (Type 3 firm).

For Type 2 firms, the choice was to participate in either the domestic or the export market. Given the close linkage with buyers in the domestic market, there exists sunk cost to re-enter it once a firm leaves. On the other hand, the sunk cost for the export market is negligible due to the secondhand capital market and subcontract orders from FDI firms. With these assumptions, the dynamic decision making problem indicates that a firm starts to export only when export profit during this period is greater than current domestic profit. However, production function estimates indicate that the both markets share the same function and no significant learning-by-exporting. Hence, profit gain by shifting to the export market is expected only when production size is expanded, but it is up to financial capacity.

For Type 3 firms, the export decision was made independently of the domestic market. Since simulation results indicate that their expected profit was positive and relatively large, risk preference is the only possibility to account for the local firms' non-participation. Risk preference also accounted for differing responses to export opportunity among Kenyan local exporters and non-exporters, given that similar profits are expected among them. But it is not the solo determinant of the difference with Bangladeshi exporters, as the latter firms had significantly larger expected profit than Kenyan firms. Lower expected profit for Kenyan firms is a result of high labor cost rather than low productivity. Our investigation indicates that absorptive capacity did not impact the spillover and, rather credit constraint and high cost of labor appear to have yielded the difference in the firms' response between Kenya and Asian LICs.

In the next section, the spillover process in the Kenyan garment industry is described. A simple model of a local firm's market choice is constructed as an analytical framework of export participation in the third section. The fourth section investigates the feasibility of local firms to start exporting from the aspect of

absorptive capacity, and the fifth section approaches it in terms of credit accessibility. Based on those results, expected profit is simulated and the firms' incentive is investigated in the sixth section. The last section concludes the discussion.

2. FDI and Export Participation by Local Firms

2.1 Overview in the LICs

The assembly process of garment production is characterized by relatively simple technology compared to other manufacturing activities. The sewing machine is the main equipment and the use of a simple sewing machine remains cost effective when combined with adequate worker skill and organization (Lall and Wignaraja [1994]). In particular, for standardized and low-priced products, the requirements for both management, which includes the design and control of the production line, and worker skill are not so stringent. Skilled workers with some experience can manage the production line, and operator skills do not require a high level of education and can be attained on the job. This simplicity of technology enables the production of garments in LICs with poor human capital.

In contrast, a high amount of barriers exist in marketing due to the wide variety and quick change of consumer tastes. The latest market information is assembled through retailers in developed countries, and taking that advantage, they provide full specification of products with manufacturers (Gereffi and Memedovic [2003]). While linkage with retailers is important, it is restricted with manufacturers and trading companies in developed countries and East Asia, which have established a linkage through long-standing business relations with retailers. Hence, the involvement of foreign firms is essential for the start of garment exporting from LICs, which takes the form of FDI or subcontracts from foreign trading companies or manufacturers.

Production technology and know-how is obtained by sending skilled workers from manufacturers in a host country, or sending local workers to a developed country for training. Technology and knowledge accumulated in exporting firms is further transferred to other local firms through turnover of experienced local workers as well as subcontracting with them. Rhee and Belot [1989] documented that production technology was transferred to Bangladeshi workers through training in South Korea and further spilled over to other firms through labor turnover.

The presence of foreign firms also contributed to the improvement of infrastructures and institutions. Export processing zones with transportation and energy infrastructure were established in many countries, and in Bangladesh, a Korean firm supported the government to create an efficient import duty exemption system (Rhee and Belot [1989]). Such arrangements, as well as the transfer of production technology and marketing arrangements, contributed to the reduction of sunk cost in starting exports.

Export participation by local firms was most impressive in Bangladesh. Five years after the first garment exports to the US market, about 700 local exporters were in operation. In Mauritius, FDI from Hong Kong first came in 1975 seeking for a non-quota status in the US market and the preferential trade agreement

with EU, and from that time, garment exports had been expanding until 2000. Following the emergence of FDI, local entrepreneurs (i.e., local sugar corporations, small businesses and even individuals) had invested in the garment industry and it was estimated to have contributed more than 50% of the total investment (Bowman [1991]). In Sri Lanka, garment exports were triggered by FDI mainly from East Asia in the late 1970's, but local firms also ventured into exports and recorded a performance on par with foreign firms (Athukorala and Rajapatirana [2000], Lall and Wignaraja 1994).

2.2 Garment Export in Kenya

Until the early 1990s, garment products were protected from imports in Kenya. Thanks to the protection and relatively rich technological base, the Kenyan garment industry exported mainly to East African countries. Trade liberalization, which became effective after 1993, has brought a massive increase of imported products and, consequently, the garment industry has shrunk significantly (McCormick et al. [1997], Wignaraja and Ikiara [1999]). Compared with 1991, production in 2000 is about half, while imported value is about nine times greater (Figure 1). Particularly, second hand imports increased more rapidly and have dominated the domestic market, particularly for low-income classes. Many firms have shut down, and mainly the producers of uniforms, which can avoid competition with imports, remain operating. In the survey conducted in 2003, we found that among firms with more than 10 employees, 166 had closed by 2003, while only 105 firms were operating in major cities.

Export opportunity was brought about through the enactment of the African Growth Opportunity Act (AGOA) in 2000. AGOA is a US domestic act devised to remove tariffs on a broad range of products imported from SSA countries satisfying certain political and economic conditions. It has a distinctive feature in the rule of origin for garment products, which allows less developed beneficiary countries (LDBC) to use fabrics and yarn made in a third country.[4] This rule makes AGOA much more attractive than the other preferential trade agreements such as the Cotonou Convention. This new trade scheme has had a drastic impact on the African garment industry. Several African countries have been rapidly increasing garment exports to the US market and in Kenya, exports grew by 600% between 1999 and 2004 (Figure 1).

Rapid growth in exports is largely brought about by the firms registered in Export Processing Zones (EPZs), which accounted for 85% of the exports to the US in 2002. After the enactment of AGOA, new investments in the garment industry have flown into EPZs, and in 2004, 30 garment firms produced 2.2 million US dollars, and employed 34,600 workers (Table 1). EPZ firms produce mainly low-priced basic wear ordered from US buyers. All firms are funded with foreign capital from the Middle East (Bahrain, UAE), South Asia (India, Sri Lanka) and East Asia, while some firms are joint ventures with domestic capital. They use imported fabrics from East and South Asia and hence, the only garment assembly process is located in Kenya.

EPZ firms differ from local firms in terms of size, the market to which they supply, and the origin of

[4] LDBC is defined as a country whose GDP per capita in 1998 was less than US $1500.

capital. Table 2 indicates the characteristics of the two groups, focusing on firms with more than ten employees. Given the lack of reliable statistics of local firms, we made an estimation based on our survey in 2003. It showed that local firms are far smaller in size and production and less export-oriented than EPZ firms. EPZ firms have already surpassed the local garment firms in terms of total employment and production.

The growth trend was disrupted in 2005 following the termination of the MFA. The abolition of the export quota imposed on main exporters resulted in a massive increase of exports from competitive countries like China and India, and consequently, exports from Africa have dropped by 16%. Although the adverse effect was relatively small in Kenya (-0.8%, Figure 1), the growth trend disappeared and several EPZ firms were closed down.

2.3 Local exporting firms

We have identified that at least 19 local firms started or significantly increased exports to the US and EU market after the arrival of FDI (Table A1 in appendix 1). Though a few firms were exporting to the US/EU market with a small share of output and many firms exported to African markets, they are not included in FDI spillover due to their having less relevance to FDI. As African markets differ widely from the US/EU markets in terms of the type and quality of products, the volume of orders, and competition in the market, exports to the African market unlikely resulted from the transfer of technology and knowledge from foreign firms.

Although sufficient information was not obtained from some firms, we believe that our estimation of the number of local exporters is fairly accurate.[5] Among the 19 local exporters, 15 firms were newly established as an exporter (new exporter), while 4 firms used to supply to the domestic market and then, have added or switched to the US market (switched exporter, Table 3). Most of the new exporters were set up after 2001. All local exporters from which we managed to get information (16 out of 19) produced export garments on subcontract order (CMT) as a major part of sales, while several firms were taking orders directly from foreign buyers (FOB) as well as subcontracting. Subcontract orders were mostly from EPZ firms in Kenya, and some of them were from Middle-Eastern firms.

Among them, only six firms remained in operation in 2006, and two of them have switched to the domestic market. Such a decline of local exporters is due to a sharp drop in subcontract demand by EPZ firms, which also experienced a decrease of orders from US buyers after 2005.

We have interviewed 7 new exporters and 3 switched exporters among the 19 local exporters. The number of employees of the interviewed firms range from 13 to 800 and the average is 231, which is 2.9 times larger than the average of local firms and about 20% of the average EPZ firms. Turnover also has large variation from 5.9 million to 265.0 million KShs and the average is 60.0 million KShs, which is 19% of the average EPZ firms (Table 2). There is clearly a minimum scale in export production; except for one

[5] We mainly based this on the list of firms registered as Manufacturing under Bond (MuB) to identify a local exporter, because they are likely to register as MuB, which allows them to keep imported material bonded. However, we were not able to confirm 14 firms on the list, mainly because the registered phone number was not in service. It is likely that most of unidentified 14 firms did not start an operation.

small firm, all local exporters employ more than 70 workers and most of them have 130 workers (Table A1).[6] Although the local exporters are larger than the average local firms, they are much smaller than the average EPZ firms in terms of employment and turnover.[7]

The imitation of the export business by local firms is surprisingly small in size and poor in performance compared with the other garment exporting countries. The inactive response by local firms is possibly related to the termination of MFA, since they may have expected significant change in the export market after 2005 and suspended investment until they knew how the market would be. If part of the capital is sunk, decision making will be forward-looking and this can be considered rational behavior regardless of a firm's risk preference (Dixit and Pindyck [1994]). In addition, there was uncertainty in regard to the AGOA. While the concessional rule of origin was crucial for African exporters to remain competitive in the US market, it was scheduled to be revised in July 2004 and just before the termination date, no decision regarding the change had been reached (the rule was finally maintained). However, our interview with local firms indicates that almost all of them were unaware of these institutional uncertainties in 2003. Though our interview was conducted after those events, only 4 out of 18 firms interviewed replied that they had known of the MFA termination and had anticipated the shrinkage of exports in 2003, and none of them were aware of the possible change of the rule of origin in the AGOA.[8] It was also revealed that even many local exporters were unaware of the termination of MFA when they started. Little information of institutional change was shared in the local industry perhaps because EPZ firms did not have any incentive to tell local firms about these uncertainties and few local non-exporting firms had connections with foreign firms.[9] This evidence suggests that the institutional uncertainties were unlikely to have affected the local manufacturers' choice of market.

It is also noted that the volume of FDI and the growth of garment exports in Kenya was no less than that of the other garment exporting countries. Employment by EPZ firms in 2004 was as large as that of Mauritius in 1984 and larger than that of Sri Lanka in 1985, which is about 10 years after the start of exports in both countries. The annual growth rate of exports between 2000 and 2004 in Kenya was 58.5%, which is much faster than the growth rate in Mauritius from 1985 to 1990 (30.0%) when the fastest growth was recorded. Reflecting the growth of exports, EPZ firms offered subcontracts to many local firms. Among the local firms in which the author conducted interviews, 72.7% were contacted by them about subcontracts.[10] Although there were about 120-150 garment firms with more than 10 employees in Kenya based on our estimation (Table 2), only 4 firms switched to the export market.

In contrast, the newly established firms have been more positive about starting an export business. Owners of the new export firms were mainly from another industry and invested in garment exports as a

[6] One small firm (firm C in Table A1) specialized in printing.
[7] According to the Table 2, turnover per worker of EPZ firms and local exporters is less than that of local, non-exporting firms. This is because exporters are often given materials by buyers and their sales do not include material costs.
[8] Given that the AGOA change is as important as the MFA termination in the context of African exports, four firms' replies that they were aware of termination of MFA are reserved.
[9] This is according to the author's interview.
[10] New exporters are not included.

diversification of business. As far as we know, four owners have experience in the textile or garment industry, while eight owners have experience in another industry or public sector, which includes the export of horticultural products, transportation, supermarkets and hotels. An investment seminar held by the government and World Bank in 2003 facilitated the dissemination of information regarding investment opportunities. Although these business owners had very little experience and knowledge in garment production, they were more open to engaging in garment exports.

3. Analytical Framework and Methodology

3.1 Analytical Framework

A firm's decision to enter the export market is based on two aspects of economic theory; the learning of technology and knowledge, and investment. As we will see later, entering into the export market is not simply a choice of markets because it requires substantial change in the production process and an understanding of the export market. Thus, firms attempting to start exporting, even in the form of a subcontract, need to learn the technology as well as the market. In the literature of technology transfer, absorptive capacity influences the firm's ability to acquire knowledge.

Absorptive capacity is a firm's ability to adopt, adjust and operate technology that is available in the world but new to the firm. A firm with poor absorptive capacity may not absorb new technology even in the presence of FDI, or may utilize new technology in an inefficient manner. While the concept is detailed in the literature of technical capability with ample supporting evidence (Nelson and Winter [1982], Evenson and Westphal [1995]), it is also utilized in endogenous growth theory, technology choice model and FDI spillover literature (Nelson and Phelps [1966], Keller [1996], Jovanovic and Nyarko [1996], Glass and Saggi [1998]). Literature analyzing the technical aspects of the African firms implies that African firms have a low capacity of absorption (Lall [1999], Biggs et al. [1995]). However, most of the local exporters in Kenya were newly established by entrepreneurs with little experience in the industry.

Entering the export market entails investment in most cases. If a firm starts production for an export market, it needs to invest in physical capital and possibly in the creation of distribution channels, logistics infrastructure, human capital and knowledge of market demand. Given the uncertainty regarding the future profitability of the export market, whether or not such investment is sunk becomes a crucial issue in making the decision to export. As Dixit and Pyndick [1994] argued, if uncertainty is a Markov process and investment is irreversible, a firm may have incentive to refrain from investment even when expected future profits are greater than the investment value. Standard model assumes that a firm needs to invest sunk cost I when it participates in the export market if it does not export during the period right before, and profit from the export market, π^f_t, is serially correlated. Let the profit from the domestic market be π^d_t, discount rate be ρ, and the decision of export participation be s_t where s_t=1 when a firm starts to export. A firm's value function is described as

$$V_t = \max_{s_{t+\tau}} \left(E_t \sum_{\tau=0}^{\infty} \rho^{\tau} \left[s_{t+\tau} \left(\pi_{t+\tau}^{f} - (1 - s_{t+\tau-1}) I \right) + \pi_{t+\tau}^{d} \right] \right) ,$$

which leads to Bellman's equation

$$V_t = \max_{s_t} \left(E_t \left[s_t \left(\pi_t^{f} - (1 - s_{t-1}) I \right) + \pi_t^{d} + \rho E_t \left[V_{t+1} | s_t \right] \right] \right) .$$

This characterization implies that a firm participates in exporting whenever

$$\pi_t^{f} + \rho E_t \left[V_{t+1} | s_t = 1 \right] \geq (1 - s_{t-1}) I + \rho E_t \left[V_{t+1} | s_t = 0 \right].$$

This implies that non-exporting firms start exporting when expected future profits earned from starting to export at that time are greater than sunk costs plus expected future profits should they decide to wait during this period. Since a firm can start exporting after t+1, the second term in the RHS contains not only future profits of domestic supply but that of export supply, which is called the option value (Dixit and Pyndik [1994]). As option value is greater than or equal to zero, a firm has an incentive to wait even if future expected profits in export market exceed fixed costs.[11]

We make some modifications to the standard model so that our model fits with the reality of the Kenyan garment firms. Though the standard model does not incorporate it, credit constraint is significant among Kenya firms (Isaksson and Wihlborg [2002]), and has received considerable attention in the FDI spillover literature. A firm with credit constraints may find it difficult to finance investment to supply to the export market or to multinational firms (Javorcik and Spatareanu [2009]). In the case of the garment industry, initial investment is needed mostly for expansion of physical capital, given that subcontracting from foreign firms does not require a long-distance logistics factor, distribution channels in foreign countries or customs clearance as we will see in section 4. However, as mentioned, there is a minimum production scale for export production, which is larger than the average scale of local firms. A firm that is unable to finance at a minimum scale has no possibility of participating in the export market. And given the exchangeability of equipment between domestic and export supply, moderately credit-constrained firms may manage to prepare the minimum capital by utilizing the current capital used to supply in the domestic market. In contrast, those with good credit access can finance export production facilities in addition to domestic ones as assumed in the standard model. Therefore, the degree of credit access substantially affects the export decision problem, and for convenience, we call the firm that is not able to finance minimum capital a Type 1 firm, the moderately constrained firm a Type 2 firm and the firm with good credit access a Type 3 firm. For Type 2 firms, the export decision problem becomes a choice between participation in the domestic or the export market.

Another important characteristic in the Kenyan context is that once a firm withdraws from the domestic market, re-entrance to it necessitates sunk cost to rebuild the relationship with buyers due to the strong

[11] On the other hand, the above condition implies incumbent exporters continue to export under the less restrictive condition as they do not consider fixed cost I anymore. So sunk cost leads to a difference in export decision between current exporters and non-exporters. Robert and Tybout [1997] showed empirical evidence of effect of sunk cost on export decision (as did some other studies, i.e., Bernard and Jensen 1999, Clerides, Lach and Tybout 1998).

linkage between buyers and suppliers. Because of the low number of suppliers in the Kenyan garment market and the fact that the main products of local firms, uniforms, require frequent contact with buyers to satisfy customers' exact specifications, linkages between buyer and supplier are relatively stable. In contrast, the investment for exports is less likely to be sunk, since the investment is mainly for physical capital and there is a secondhand market in Kenya.[12] Thus, for the Type 2 firm, the decision problem is dynamic because of the sunk cost of the domestic market, while it is more of a static problem for Type 3 firms given the substantial reversibility of investment.

Let us assume a positive sunk cost for re-entrance to the domestic market, $W>0$, no sunk cost for the export market, and reversible physical capital. Now the cost of capital is incorporated in profit as a rental cost, and then, Bellman's equation for a Type 2 firm is

$$V_t = \max_{s_t}\left(E_t\left[s_t\pi_t^f + (1-s_t)(\pi_t^d - s_{t-1}W) + \rho E_t\left[V_{t+1}|s_t\right]\right]\right).$$

And a firm decides to export when the following condition is satisfied:

$$\pi_t^f \geq \pi_t^d + s_{t-1}W + \rho\left(E_t\left[V_{t+1}|s_t=0\right] - E_t\left[V_{t+1}|s_t=1\right]\right). \qquad (1)$$

This condition differs from the one based on the standard model in several aspects. Firstly, given that sunk cost applies to the domestic market rather than the export market, the critical profit level that a firm chooses an export market is higher for exporters than for non-exporters. The critical value for the exporter is $\pi_E^{f*} = \pi_t^d + W + \rho\left(E_t\left[V_{t+1}|s_t=0\right] - E_t\left[V_{t+1}|s_t=1\right]\right)$ and they now consider sunk cost W, while the one for non-exporters is $\pi_N^{f*} = \pi_t^d + \rho\left(E_t\left[V_{t+1}|s_t=0\right] - E_t\left[V_{t+1}|s_t=1\right]\right)$ and they do not. Secondly, as the problem is making the choice between the two markets, the profit of exports is compared with the profit from the domestic market. It is noted that the third term in the RHS of (1) is the difference of expected future profit when $s_t = 0$ and $s_t = 1$, and it is necessarily positive for non-exporters at t. By remaining in domestic supply at t, a firm can avoid the possible loss that an exporter incurs at $t+1$ in case $\pi^f_{t+1} < \pi^{f*}_E$, while it can switch to the export market without sunk cost whenever it is more profitable. Therefore, $E_t\left[V_{t+1}|s_t=0\right] > E_t\left[V_{t+1}|s_t=0\right]$ holds and the last term in (1) is positive. The reservation of this statement would be in the case where future profit (π^f_t) has an upward trend. Learning-by-exporting is a typical example; firms supplying the export market necessarily improve productivity faster than non-exporting firms, and hence, future profits grow faster.[13] Then, the last term in (1) can be negative. Hence, if the learning-by-exporting effect is not substantially large, the participation condition (1) indicates $\pi^f_t > \pi^d_t$, that is, a non-exporter does not switch to the export market unless the current export profit is greater than current domestic profit. On the other hand, the decision problem of Type 3 firms is likely to be static given the small sunk cost for export participation, and they start exporting when the current export profit is positive.

The above model assumes risk neutral firms, but in the context of Africa, literature indicates that firms

[12] Second hand machines were found in retail shops. Most respondents replied to the question about resale value of equipment in our survey.

[13] Empirical evidence of learning-by-exporting is mixed. See the footnote 2 for literature.

are risk averse because of poor access to credit (Collier and Gunning [1999], Bigsten et al. [2003]). Due to stronger linkages between buyers and suppliers in the domestic market, it is reasonable to assume that domestic profits are more stable than those of exports, and risk-averse firms prefer the domestic market if expected profit is the same. In that case, critical profits triggering export participation (π^{f*}_{N}) rises by risk premium, which is determined by difference in perceived risks in the two markets and degree of risk aversion of individual firms.

This analytical framework is consistent with the result of the interview with local exporters. Table 4 indicates that 10 firms among 18 samples named difficulty of physical investment as a reason not to start exporting. Six firms replied that the export market is risky mainly because of the volatility of demand. The profitability of the export market is questioned by 10 firms (including those that replied that the current domestic business is profitable) in comparison with the domestic market. This implies that they compare the export and domestic markets rather than viewing the export market independently. Many firms explained that low expectations of the export market are mainly due to uncertainty of order and the relatively large physical investment required.

In some cases, information about the new market is imperfect, and firms need to guess about it based on the available knowledge. Social learning literature analyzes decision making under such a situation. If firms can learn from other firms that have adopted new technology, decision making is influenced by the neighbor's decision and can be strategic (Chamley [2004], Foster and Rosenzweig [1995], Kapur [1995]). We rule out the possibility of social learning in our analysis due to the following evidence. Most of the local firms communicated with EPZ and got to know the details of subcontract orders such as product specification, quantity and order price. The interviews with managers revealed that for local firms with experience in garment assembly, it was not difficult to guess how profitable they were. Newly established firms got direct information on profitability from communication with EPZ and local exporters rather than guessing based on input/output information. It is possible that some entrepreneurs did not believe this information, given their inability to evaluate it, and decided to wait for more signals to obtain more precise information. Yet the fact that the response of entrepreneurs was more positive than that of local garment firms refutes that the strategic behavior of entrepreneurs is a main cause of the limited spillover.

3.2 Methodology for Identification

Though standard methodology to identify determinants of export participation is an econometric approach using the probit or logit model (i.e., Roberts and Tybout [1997], Bernard and Jensen [1998], Javorcik and Spatareanu [2009]), it is not applicable in our case due to the small number of firms entering the export market in the sample as well as in the population. Our approach is to directly investigate the structure of firm's market choice problem using the qualitative and quantitative information of individual firms. Based on the above framework, local firms' non-participation in the export market is attributed to that they were either not able to do so due to poor absorptive capacity and lack of credit access, or they were not motivated due to unattractive profitability and/or high risk in the export market. In this paper, these two factors are approached separately.

Firms' absorptive capacity and credit access are investigated through interviews with local firm managers. Local exporters' experience of learning and their performance provides the basis for the capacity of local non-exporters. In particular, the fact that new exporters with relatively poor prior knowledge and experience started exporting indicates that absorptive capacity is unlikely to be a barrier for local firms with more experience. Experience in other developing countries also substantiates that required capacity is not so high that firms without experience can absorb FDI spillover. Through an examination of the performance of new exporters, we will examine the Kenyan case. Credit access will be estimated from local firms' credit use. Also, by estimating the minimum capital value from capital demand function and comparing it with local firms' current capital value, we will determine the investment necessary for an individual firm to start exporting. In principle, these estimates will tell us whether a firm can start to export or not, but in practice, it is very difficult to know precisely how much credit a firm can access. Therefore, we will at least identify a firm without access to formal credit, and if its capital value is less than the minimum scale, we recognize that the firm is Type 1 and not able to participate in the export market.

For moderately credit-constrained firms (Type 2), the above framework indicates that the decision to export is determined by its expected profits relative to domestic markets and risk preference. To understand the expected profits, production functions for both markets are estimated and expected profits are simulated based on the individual firm's characteristics. Characteristics of production technology serve as a key to satisfying the participation condition (1) for Type 2 firms, since for export profits to be sufficiently larger than domestic ones, we should see a significant gap in production functions between the two markets, or increasing returns to scale so that the expansion of the production scale leads to higher productivity. Alternatively if learning-by-exporting works, firms are motivated to start exporting without a jump in profit in the short term. Those characteristics of production function will be investigated.

While the shape of production function is common to all firms, a firm's characteristics, including factor prices and productivity are related to the heterogeneity of response. Type 2 firms with a large ratio of export profits to domestic ones and Type 3 firms with large expected export profit are more likely to start export, controlling the firm's risk preference. Though we simulate and compare expected profits between exporters and non-exporters using profit function estimates, we do not have unbiased risk information on individual firms. Therefore, what is known from this simulation is that if expected profits do not differ significantly between exporters and non-exporters (or the non-exporters' expectation is higher), the difference of response is accounted for by risk preference. That is, non-exporters are more risk averse than exporters. In contrast, if non-exporters' expected profit is lower than that of exporters, then we can know that the firm's production characteristics lead to their non-response through lower expected profits, while we are not sure about the contribution of risk.

This approach has advantages in terms of investigating the structure of the decision problem. In most econometric approaches, the reduced form representing the relationship between a firm's characteristics and realized choice is estimated, yet the true pattern is that characteristics affect choice through a firm's expectation on profit earned in a new market. The reduced form relationship may incorrectly estimate determinants if omitted variables and/or endogeneity problems are significant. By directly looking at

expected profit, our methodology avoids misidentification of determinants. On the other hand, difficulties lie in the collection of measurable data related to decision making. Only qualitative information of absorptive capacity is available for non-exporters and hence, it is estimated based on the performance of young local exporters. Also, as discussed above, the degree of a firm's risk preference is not available, and its impact on decision entails ambiguity to some extent.

3.3 Estimation of Production Function, Productivity and Expected Profits

Given the small number of exporters in Kenya, we added Bangladeshi firms to the sample to estimate production function so as to have robust estimates. Bangladeshi firms are exporting low-priced garments, which are in the same market segment as the products of Kenyan exporters. Given their success in the export market for more than 20 years, it is reasonable to regard them as a representative exporter in a low-income country. Furthermore, the addition of Bangladeshi firms allows us to compare expected profits between local firms in Kenya and a successful exporting country, and to investigate the difference of local firms' responses to export opportunity.

OLS and stochastic production frontier model are used for the estimation of production function. The endogeneity problem on input choice may arise if a firm determines the amount of input, particularly labor, knowing its own productivity which is unobservable for us. The fixed effect model and some estimation procedures, such as those by Olley and Pakes [1996] and Levinson and Petrin [2003], have been suggested, but they are not applicable to cross-sectional data. Stochastic frontier model can avoid this problem by making assumptions on the distribution of productivity. In this methodology, a firm's productivity is measured as technical efficiency which represents dispersion from the production frontier indicating the greatest output given inputs among the samples. Specifically, it assumes a production function

$$Y_i = \alpha\ K_i^{\beta 1} Ls_i^{\beta 2} Lu_i^{\beta 3}\ TE_i\ error_i, \qquad (2)$$

where *Y*: output, *K*: utilized capital, *Ls*: skilled labor, *Lu*: semi-skilled labor, *TE*: technical efficiency with value between 0 to 1, *error*: stochastic errors with mean at one, and *i* represents an individual producer. TE is estimated by separating regression residual to TE and random error based on the assumption on distribution of TE (Jondrow et al. [1982]), though we do not know it. As choice of distribution affects estimate of parameters as well as technical efficiency (Kumbhaker and Lovell [2000]), we have used several distributions to check sensitivity.

Productivity is estimated to measure the performance of local exporters and to identify the learning-by-exporting effect. Stochastic production frontier has an advantage in productivity measurement in the sense that it separates a random shock on productivity from a firm's productivity measure. In other methods such as Data Envelopment Analysis and the index number method, productivity measure includes random shock, and thus, unexpected and idiosyncratic shock is factored into a firm's capacity. The learning-by-exporting effect is tested based on the cross-sectional variation of technical efficiency according to export experience.

To see sensitivity of distributional assumption to technical efficiency, we estimated parameters by OLS

without distributional assumption, and then, technical efficiency is separated by method of moment with distributional assumption following Olson et al. [1980]. Further, alternative productivity estimates are obtained by the index number method, which is free from the arbitrary assumption on distribution and endogeneity problem of input choice. Following Caves et al. [1982], productivity of an individual firm is measured relative to a hypothetical average firm with average inputs, output, and factor shares by the following formula.

$$\left(\ln TFP_i - \overline{\ln TFP}\right) = \left(\ln Y_i - \overline{\ln Y}\right) - \sum_n \left(\frac{s_i^n + \overline{s^n}}{2}\right)\left(\ln x_{ni} - \overline{\ln x_n}\right) + \sum_n \left(\frac{\left(s_i^n + \overline{s^n}\right)(1-\xi)}{2}\right)\left(\ln x_{ni} - \overline{\ln x_n}\right),$$

where x_n is input ($n = K, Ls, Lu$), s^n is the factor share of each input, ξ is returns to scale, and the variables with upper bar (i.e., $\overline{\ln Y}$) are sample averages. The third term is added to control returns to scale, so that estimates can be compared with technical efficiency which does not include the returns to scale effect on productivity.

The estimation of expected profits is based on a production function estimate. While local firms made estimations of profitability based on their experience, we do so using the data of exporting firms in Bangladesh and Kenya. The use of production function instead of profit function is to avoid bias stemming from the use of rental price that is not clearly observable for us. In many cases, firm owners provide their own land or money for their firms but dividend for their contribution is not clearly shown in an accounting book. Therefore, capital service cost in our firm data can be wrongly measured and, consequently, so can the rental price. If we assume the Cobb-Douglas production function, then duality of production and cost functions allows the identification of cost function from production function estimates. With the production function (2), a firm minimizes cost, $C_i = r_iK_i + ws_iLs_i + wu_iLu_i$, where r_i is rental price of capital, ws_i is the wage for a skilled worker and wu_i is the wage for a semi-skilled worker. It is assumed that the firm may misallocate inputs, and then, actual cost becomes greater than the minimum cost (allocative inefficiency). The first order conditions of cost minimization with allocative inefficiency are expressed as

$$\frac{K_i}{Ls_i} = \frac{\beta_1 ws_i}{\beta_2 r_i} AE_{1i}$$
$$\frac{K_i}{Lu_i} = \frac{\beta_1 wu_i}{\beta_3 r_i} AE_{2i},$$
$$\frac{Ls_i}{Lu_i} = \frac{\beta_2 wu_i}{\beta_3 ws_i} AE_{3i}$$

where $AE_{ni} > 0$ for all n, and it is equal to one when factor allocation is optimal, given factor price ratios.

From (2) and FOCs of cost minimization, conditional input demand functions are given by

$$K_i = \left[\frac{\beta_1^{\beta 2+\beta 3}}{\beta_2^{\beta 2}\beta_3^{\beta 3}} \alpha^{-1} \frac{ws_i^{\beta 2} wu_i^{\beta 3}}{r_i^{\beta 2+\beta 3}} \left(\frac{Y_i}{TE_i * error_i} \right) AE_{1i}^{\beta 2} AE_{2i}^{\beta 3} \right]^{\frac{1}{\beta}}$$

$$Ls_i = \left[\frac{\beta_2^{\beta 1+\beta 3}}{\beta_1^{\beta 1}\beta_3^{\beta 3}} \alpha^{-1} \frac{r_i^{\beta 1} wu_i^{\beta 3}}{ws_i^{\beta 1+\beta 3}} \left(\frac{Y_i}{TE_i * error_i} \right) AE_{1i}^{-\beta 1} AE_{3i}^{\beta 3} \right]^{\frac{1}{\beta}} \quad , \qquad (3)$$

$$Lu_i = \left[\frac{\beta_3^{\beta 1+\beta 2}}{\beta_1^{\beta 1}\beta_2^{\beta 2}} \alpha^{-1} \frac{r_i^{\beta 1} ws_i^{\beta 2}}{wu_i^{\beta 1+\beta 2}} \left(\frac{Y_i}{TE_i * error_i} \right) AE_{2i}^{-\beta 1} AE_{3i}^{-\beta 2} \right]^{\frac{1}{\beta}}$$

where $\beta=\beta_1+\beta_2+\beta_3$. Multiplying respectively by a factor price, the cost function is given by

$$C_i = r_i K_i + ws_i Ls_i + wu_i Lu_i = A\, r_i^{\frac{\beta 1}{\beta}} ws_i^{\frac{\beta 2}{\beta}} wu_i^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1}{\beta}} TE_i^{\frac{-1}{\beta}} \overline{AE_i}\,,$$

where $A = \beta \left(\alpha \prod_n \beta_n^{\beta n} \right)^{\frac{-1}{\beta}}$ n=1,2,3, $\hat{Y}_i = \alpha\, K_i^{\beta 1} Ls_i^{\beta 2} Lu_i^{\beta 3} TE_i$ (predicted output), and $\overline{AE}_i = \frac{1}{\beta}\left[\beta_1 AE_{1i}^{\frac{\beta 2}{\beta}} AE_{2i}^{\frac{\beta 3}{\beta}} + \beta_2 AE_{1i}^{\frac{-\beta 1}{\beta}} AE_{3i}^{\frac{\beta 3}{\beta}} + \beta_3 AE_{2i}^{\frac{-\beta 1}{\beta}} AE_{3i}^{\frac{-\beta 2}{\beta}} \right]$. The first through fifth terms on the right hand side compose the cost frontier function, and the last two terms represent the dispersion of actual cost from the frontier; they are the costs of technical inefficiency and allocative inefficiency respectively.[14]

Note that the above cost function accounts only for utilized inputs, since capital in the production function is adjusted by the utilization rate. Adding the cost of idle capital, η, in multiplicative form, the actual cost is described as

$$TC_i = A\, r_i^{\frac{\beta 1}{\beta}} ws_i^{\frac{\beta 2}{\beta}} wu_i^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1}{\beta}} TE_i^{\frac{-1}{\beta}} \overline{AE}_i\, \eta_i\,, \qquad (4)$$

where $\eta \geq 1$. Expected profit is obtained by subtracting expected cost from sales in the export market,

$$\hat{\pi}_i = pY - \hat{TC}_i\left(r_i, ws_i, wu_i, Y, TE_i, \overline{AE}_i, \eta_i\right). \qquad (5)$$

Estimates of expected profit will be given by inserting an individual firm's factor prices, production size, inefficiencies and share of idle capital.

It is noted that our approach can avoid bias due to measurement error of rental prices not only in parameter estimates but in the estimation of expected profits given by (5). Though rental price enters into the equation (5) directly, measurement error is offset by $\overline{AE}$, since AE_1 and AE_2 incorporate the error of rental price as shown in the FOCs of cost minimization.

3.3 Source of Information

Two types of information were collected by the author and collaborators. Firm data of the Kenyan and Bangladeshi garment industries were collected in 2003 by the Institute of Developing Economies, University of Nairobi and University of Dhaka. The survey includes 71 firms in Kenya and 222 firms in Bangladesh, of which 47 and 165 firms were used for the analysis after the elimination of the samples of

[14] $\overline{AE} \geq 1$ and equality holds when AE_n=1 for all n; the cost of allocative inefficiency is null when there is no inefficiency in input allocation.

poor quality. The number of samples reflects the size of the industries, where the Bangladeshi industry has more than 3000 firms and the Kenyan industry is estimated to consist of 120-150 firms. The sample was selected using the stratified sampling method in Bangladesh, while the Kenyan sample is the result of an exhaustive survey based on several incomplete firm lists due to the non-existence of a complete list.[15] The Kenyan sample consists of 3 local exporters, 5 foreign exporters and 39 local firms supplying to domestic and African markets (Table 6). On the contrary, all Bangladeshi firms in the sample are exporters and only two of them are foreign owned; the rest are domestically owned.

Firm interviews were conducted for Kenyan local firms by the author in 2005 and 2006 in order to collect qualitative and quantitative information about the adoption process of local exporters, and the absorptive capacity, credit access and incentives of local non-exporters to start exporting. It includes 10 local exporters and 18 local non-exporting firms (Table 5). For supplementary information, 5 EPZ firms, Export Processing Zones Authority, Ministry of Trade and Industry and Kenyan Association of Manufacturers (industrial association) were interviewed.

Information obtained through the firm interview is mainly used for the analysis of absorptive capacity and credit access, while that of the firm survey is used in the estimation of production function and simulation of profits. It is noted that the two are not perfectly matched; the survey sample is larger. Therefore, qualitative information about absorptive capacity and credit access obtained through the interviews was generalized to the simulation samples and applied to the simulation. In the process of generalization, we have been careful regarding the possible difference of firms' characteristics between the two samples. As for credit access, we used firm size as a key by which to apply the findings of the interviews to simulation exercise given the clear relationship between size and credit use.

In the following section, we start with an investigation of the absorptive capacity of local firms. Based on the result, capital availability and expected profit are estimated.

4. Absorptive Capacity

4.1 What to be learned

Local firms that attempt to start exporting have to learn mainly three aspects of business; the production system, logistics control and marketing. From the author's field observation, the production process of export products is generally more decomposed than that of domestic products because of the larger volume and shorter lead time involved. With a highly decomposed production process, an operator concentrates on a single task (i.e., sewing only the collar section of a garment) to speed up production. The production line is designed for an individual order according to the style, complexity of sewing and output per hour. Although the quality requirement is relatively loose for low-priced garments, it is generally more stringent than that of domestic products. These differences require local firms to change the design of the production

[15] See Appendix 2 for details of the sampling method and data construction.

line, quality control system and training of operators. It should be noted that change of workers' training is not necessarily an upgrade. In local firms supplying to the domestic market, not only is the assembly line shorter but fewer helpers are needed to support operators than in exporting firms.[16] This means that operators in local firms have to cover a wider range of jobs than those in exporting firms, and in some cases they produce the whole garment by themselves. In fact, the average tenure of operators in local firms is longer than that of exporters in Kenya and Bangladesh.[17] Therefore, while higher quality is needed, the range of jobs covered by an individual operator is narrower for export products.

In the case where a firm receives orders from foreign buyers, control of logistics is important, given the strict delivery required for export products and long distance to the market. Kenyan garment exporters, in particular, have to be attentive to logistics, because they import fabrics from Asia and custom clearance is regarded as inefficient and corrupted. Delay of delivery results in a penalty to the discounted price and risks future transactions. However, as long as a firm works as a subcontractor for a Kenyan exporter, it does not need to be concerned with logistics.

Marketing is a barrier for local firms that have little experience in the international market. Garment markets in developed countries have been favoring wider variety and frequent change of style, and to deal with this change, retailers are creating strong networks with suppliers. Suppliers are required to produce within a short lead time and deal with frequent change of product style (Nordas [2004]). Retailers in most cases contract with firms called "full-package providers" which arrange manufacturers at every step of production around the world (UNCTAD [2002: Chapter V]). Garment manufacturing firms normally receive orders from this agent, but new firms that have few transactions and a small capacity are less likely to be given orders. Inspection and certificates by a buyer are usually needed. Subcontracting is much more accessible than directly transacting with a buyer or full-package provider, and most new firms start as subcontractors.

4.2 Transfer of knowledge and technology

Knowledge has been transferred to local firms mainly through the movement of foreign skilled workers. In our samples, all new exporters recruited expatriates who had formerly worked in EPZ firms. The expatriates were originally from South Asia, namely Sri Lanka, India and Bangladesh, and had working experience in their home countries as floor-level workers. They are specialists of garment production and played an important role in production management in EPZ firms—designing the production line, training workers, and controlling product quality. After several years, they quit the EPZ firms and started new firms with Kenyan entrepreneurs.

Since the owners of new exporters do not, in most cases, have experience in garment exporting, the expatriates have provided almost all the knowledge and technology necessary for garment exports. In addition to production management, they substantially contributed to marketing, utilizing the network with

[16] The average number of floor-level workers per sewing machine is 1.78 for Bangladeshi firms, 1.47 for EPZ firms and 1.13 for Kenyan local firms.

[17] The average tenure of floor-level workers in Kenyan local firm is 4.0 years, while it is 2.3 years for Bangladeshi firms.

EPZ firms that they had developed in the previous job. Although three owners have experience in the garment industry and the other four owners have run trade businesses, which has partly contributed to the new business, they recognized that they relied mostly on the expatriates' knowledge.

Switched exporters are less reliant on expatriates. Firm A in Table A1 employed a UK retired engineer when it started UK exports in 1992, and has employed several Indian expatriates since 2000, but their role is limited to production and the owner developed a marketing network by himself. Firm B does not have an expatriate, and the owner learned new technology through a training course held by his supplier.

Despite the predominance of Asian Kenyan in the garment industry, among 19 local exporters, owners of 13 local exporters are African Kenyan, while those of 5 exporters are Asian Kenyan and one is European (Table A1).[18] Information on technology and knowledge has prevailed beyond the business community formed by Asian Kenyan. The workshops for investment of the garment industry held by the EPZ Authority with the World Bank provided information on investment opportunity to African Kenyan entrepreneurs. Also, the owner of firm D played an important role in dissemination by showing his factory, giving basic information on the subcontract business, and referring expatriates to several African entrepreneurs. Several managers of new exporters expressed that he was the most significant source of information when they were establishing their companies. In contrast, communication among the Asian business community was shallow, particularly among garment assemblers. Interviews revealed that Asian managers communicate frequently with their suppliers and buyers, while they communicate much less frequently with other assemblers. Public and personal networks facilitated the dissemination of information among African entrepreneurs.

We have identified only one case (firm R) in which local workers in an EPZ firm started a new exporting firm, which was quite common in Bangladesh as a form of spillover. The owner of firm R was a Human Resource manager of an EPZ firm for three years and has no experience as a production worker. It is evidenced that EPZ firms provide on-the-job training to local workers, but we have not seen any Kenyan staff working as production managers in any EPZ firms.

Subcontracting with EPZ firms provided local exporters with knowledge as well as time in which they learn. EPZ firms help local firms' learning by providing instruction and showing their production line. Several local exporters explained that contacts with EPZ firms were a main source of knowledge. Furthermore, subcontracting significantly reduces the amount of necessary knowledge and investment that are required for local firms to start exporting. For example, marketing is the largest problem for young firms with few networks. In our samples, several local firms jointly participated in the textile trade show in US to seek contracts with US buyers but it was not successful. Even if they succeed in finding a buyer, to import fabrics, they are required to open a letter of credit, which is not easy for young firms. The purchase of fabrics occasionally requires liquidity in cases where the collection from sales takes time. Local exporters recognized such problems; in fact, some of them did after they started to subcontract and were trying to develop their capability while subcontracting. Although reliance on the subcontract needs to be

[18] One owner has British nationality, though he was born in Kenya and his family is originally from India.

reduced for further growth, it enables young firms to start an export business and learn the necessary knowledge for competing in the international market.

Inflow of FDI has brought the knowledge and technology of garment exports to Kenya. They have been transferred to local firms, though on a relatively small scale, through the movement of foreign skilled workers and vertical linkage with EPZ firms. Moreover, working experience in EPZ firms improved the skill of local workers, which indirectly supported the local exporters who employed those who had been trained in EPZ firms. Local exporters, particularly new exporters, fully benefited from the spillover from FDI.

4.3 Absorptive Capacity

The cases of new exporters provide substantial information on the absorptive capacity of local firms. Owners of new exporters admitted that they have little knowledge of the garment export business, but they also expressed that they had no serious problem when starting their business. This suggests that knowledge brought by skilled expatriates was sufficient to at least start the business. To confirm results drawn from the interviews, local exporters' productivity is compared with that of Bangladeshi and Kenyan EPZ exporters (lines 2 and 3 in Table 6). Although the number of local exporters in the sample is three (out of eight local exporters in the population at that time), all three firms had only two years of experience in exports, so that it provides reference information on the relative performance of the infant local exporters. Three stochastic frontier models and relative TFP are used for estimation to check the sensitivity of results to model assumption.[19] In all the estimates, their average technical efficiencies are higher than the average of Bangladeshi and EPZ firms, and the difference is significant in one case. The fact that three samples involve two new exporters indicates that entrepreneurs without experience in garment production were able to achieve the average productivity in a short period. This result supports the qualitative information that most of local firms, even those that have little knowledge of the export business, quickly absorbed the necessary technology and knowledge by hiring expatriates.

Our result is consistent with the case of other garment exporting countries. It is reported that in Bangladesh, labor turnover facilitated spillover of technology to local industries which had only poor capacity (Rhee and Belot [1989]). Mauritius also did not have strong textile industry before FDI came (Bowman [1991]). Surveying the cases in developing countries, Lall and Wignaraja [1994] state that entry barriers to production of standard garments arose from the skill requirement for management and export marketing, while the requirement for worker skill is relatively low and easy to acquire. Their statement corresponds with the Kenyan case in which expatriates provided managerial skills with local exporters and subcontracting with EPZ firms exempted them from marketing at an international level.

5. Credit Constraint and Export Opportunity

[19] Assumption and the estimation results of production function are described in section 6.

The initial investment required for a garment assembler is relatively small because of its labor intensiveness. The most crucial equipment is sewing machines; machines for cutting fabrics and washing and pressing final products may also be needed, depending on the product. While Kenyan local manufacturers have 51.6 sewing machines on average, the average number in Bangladeshi firms is 173 machines, and even the 25 percentile firm equips 111 machines. Therefore, many of the Kenyan local firms needed to expand their capacity. Minimum capital size is estimated by conditional capital demand function shown in equation (3) with assumption on minimum output.[20] We refer to the actual output of the relatively small local exporter, which employs 84 workers, as the minimum scale. Firm's characteristics, such as factor prices and efficiencies, are entered into the function, which gives an estimated capital demand for an individual firm. Based on the result of the previous section on absorptive capacity, local firms are assumed to maintain the same technical and allocative efficiency as they did in the domestic market.

Thirty-nine local non-exporting firms in the survey were used for simulation. The simulated value for a firm with average characteristics is 38,873 US$. Comparing the estimates with the current capital value, necessary investment is estimated for the individual firm. Table 7 indicates the ratio of necessary investment to current capital value by firm size. It shows that 3 firms have sufficient capital, while 36 firms need expansion and 23 of them need to increase by more than double.

Credit accessibility is investigated through interviews. Access to formal credit clearly differed according to the size of the firm. With the exception of one case, none of the firms with less than 49 workers had used formal credit for last 5 years, while 75% of those with more than 50 workers have used formal credit (Table 8). The manager's judgment of credit accessibility almost always corresponded with credit use (right hand side of Table 8). Then, we set a boundary for credit access at 50 workers. Combining this information and Table 7, it has been identified that firms with less than 49 workers and less than the minimum capital size cannot start to export due to lack of credit (Type 1 firm) and account for 71.8% of local non-exporting firms in our sample (shaded area of Table 7). Assuming our sample represents the population, the simulation results suggested that about 72% of local firms were not financially feasible to enter the export market.

The other 11 firms are possibly Type 2 or 3 if they have access to sufficient credit. Since most of financial institutes require collateral in Kenya, the amount of credit depends on the firm's assets. Hence, unless they assume assets other than production equipment, a firm cannot make an investment greater than the value of its current equipment. With this conservative assumption, all 11 firms can start to export by using their current equipment, given that needed expansion of equipment is smaller than current equipment value in all cases. With the same assumption, only three firms can invest in an additional production site for export supply, as the rest of firms' equipment value is less than the minimum scale and is not large enough for collateral. Then, only three firms are candidates for Type 3 firms, and they account 7.7 % of our sample.

[20] The simulation does not include land and building as these can be rented. See appendix 3 for details of the simulation method.

6. Expected Profitability of Local Firms

6.1 Production Function Estimation

To investigate the difference of production characteristics for export and domestic markets, a separate production function is estimated. Estimations use OLS and the stochastic frontier model, which is described as

$$\ln Y_i = \beta_{01} + \beta_{02} Sewing_i + \beta_1 \ln K_i + \beta_2 \ln Ls_i + \beta_3 \ln Lu_i - u_i + v_i ,$$

where *Sewing* is a dummy variable discerning firms with only a knitting process (=0) and those with a sewing process (=1), $\beta_{01} + \beta_{02} = \exp(\alpha)$, $u_i = -\ln TE_i$, $u_i > 0$, and $v_i = \ln(error_i)$. Inefficiency, u_i, is assumed to follow a half-normal distribution, $N^+(0, \sigma_u^2)$, or exponential distribution, $N^+(\mu, \sigma_u^2)$, and the random error component, v_i, is assumed to be normally distributed with mean zero, $N(0, \sigma_{vi}^2)$. Heteroskedasticity on random errors is considered, since group-wise heteroskedasticity around process dummy (*Sewing*) was indicated (results not reported). Specifically, auxiliary model, $\ln\sigma_{vi} = \delta(1, Sewing)$ was added to estimate σ_{vi}.

The first set of models incorporates different parameters for exporters and non-exporters to reflect their heterogeneity by adding a non-exporter dummy and its interaction terms with inputs (columns 1 and 2 of Table 9). They show that all interaction terms are statistically insignificant. The second set incorporates only a non-exporter dummy (no interaction term), and no significant difference of a constant by market orientation is indicated in either model (columns 3 and 4). Estimates based on stochastic frontier with exponential distribution assumption show the same result (not reported). Those results indicate that parameters are homogenous between exporters and non-exporters, and then, a model without a non-exporter dummy is estimated (column 4-6). Exclusion of the dummy does not lead to a drastic change of parameter estimates, while the parameter estimate for capital becomes smaller and that of labor becomes larger. Estimates of the input coefficient are significant except for a capital coefficient in the OLS model. As for the economies of scale, aggregation of parameters is greater than one in all the three cases, but the hypothesis of constant returns to scale is not rejected at the 10% level except one case. These exercises show that there is no significant change in production function by market orientation, and only weak support is found for increasing returns to scale. Therefore, shifting from the domestic to the export market does not bring substantial increase in profits without a large expansion of scale or productivity improvement.

The relationship between exporting and productivity is investigated to examine the learning-by-exporting effect. To get an overview of the relationship, technical efficiency is compared with market orientation. The results of estimation are in lines 4 and 5 of Table 6. Although the level of the averages differs by estimation model, all estimates show that the average of exporters is not higher than that of non-exporters.

To form a more rigorous investigation, effect of export status on technical efficiency is estimated. Following Kumbhakar, Gosh and McGuckin [1991], export status and export years as well as other exogenous variables are assumed to correlate with technical efficiency through the mode of its distribution

(μ) as

$$\ln Y_i = \beta_0 + \beta_1 \ln K_i + \beta_2 \ln Ls_i + \beta_3 \ln Lu_i - u_i + v_i$$
$$\mu_i = \theta_1 Export + \theta_2 Age + \theta_3 Age * Export + \boldsymbol{\varphi} \mathbf{W}_i \quad ,$$

where $u_i \sim N^+ (\mu_i, \sigma_u^2)$, $v_i \sim N (0, \sigma_v^2)$. *Export* is a dummy variable taking one for exporters, *Age* is firm age, *Age*Export* is interaction term, and $\mathbf{W}_i$ is a vector of the variables related to a manager's characteristics and business environment. As all exporters in our sample have been serving the export market since their establishment, the interaction term (*Age*Export*) picks up the effect of export experience, while the effect of general operation experience is controlled by *Age*. On the other hand, *Export* will capture the effect of export status regardless of length of experience. As frequently mentioned, the relationship between export status and efficiency can be two ways, and thus our estimates indicates only association. However, estimated associations of *Export* and *Age*Export* are not significant regardless of inclusion of other variables (Table 10).

There may be another possibility of learning-by-exporting that export will improve allocation of factors. Then, effect on allocative efficiency is investigated. Allocative efficiency enters into cost function as $\overline{AE}$ shown in equation (4). Log of $\overline{AE}$ is regressed on exogenous variables, assuming a proportional effect of export years. Table 10 shows that no significant association of export status and experience, while excluding export dummy, export years significantly reduces $\overline{AE}$. Hausman's test does not reject the null that OLS estimator is consistent, and thus, we accept the significant and negative coefficient of export experience.[21] One year of experience reduces 0.49% of the cost of allocative efficiency, which leads to a 0.14% increase in profit. Though this evidence is based on a cross-sectional sample, learning-by-exporting is also confirmed in the panel data of the Moroccan garment industry (Clerides, Latch and Tybout [1998]).

These exercises indicate that while shifting from the domestic to the export market does not entail a structural change of production function and does not lead to the improvement of productivity, it does bring about the reduction of allocative inefficiency according to years of export experience. The learning-by-exporting effect is supported, but relative to the size of discount rate, and the effect is so small that it is unlikely to have a significant impact on a firm's decision on market choice. Though expected future profits will increase by 0.14% every year, it is also discounted by 10.67% if the real interest rate is used.[22] Therefore, our exercise indicates that no significant profit change is expected for local firms by simply changing from the domestic to export market, and this leads to the following three implications. First, in the absence of any significant learning-by-export, the participation condition (1) holds. A local firm switches to the export market when export profit at this period is greater than domestic profit plus loss of future profits by choosing to export, which results from the sunk cost of re-entry into the domestic market. Second, to realize greater profit from the export market, a local firm needs to expand its production

[21] To control endogeneity of export years, IV estimation was carried out using the average tenure of skilled workers and that of semi-skilled workers as an instrumental variable. While average tenure tends to be correlated with firm's age, it is unlikely to have causation with cost of allocative efficiency that is fundamentally related to managerial capacity.

[22] Average from 1999 to 2003 based on the World Bank [2006].

capacity or improve its efficiency through the firm's unique effort. Third, as the export market is large enough to allow a firm to freely expand its production capacity, FDI may contribute to the development of local industry through an increase of production scale rather than through productivity improvement. Yet, credit access will be a constraint for expansion.

6.2 Simulation of Expected Profits

Based on the production function estimates (OLS3 in Table 9), cost function was drawn as the equation (5) and profit is simulated by the equation (6). We assume that local manufacturers will perform in the export market as efficiently as they do in the domestic market, based on the result that local exporters' performances were no less efficient, and that no significant learning-by-exporting effect was identified. Also, it is assumed that local manufacturers can employ labor for the same wages they were paying, given the substantial pool of semi-skilled workers resulting from the shrinkage of the industry after the trade liberalization. In terms of rental price, interviews demonstrated that local firms with more than 50 employees were able to borrow from financial institutions at a rate of between 14 and 20%, and in the simulation, rental price was estimated assuming a nominal interest of 20%, the maximum in the above range.[23] This rate was used for the added capital, while the rental price for the existing capital was set at the lower rate based on the national real interest rate.

Specializing case (Type 2 firms)

From the above assumptions, it is rental price and production scale that yield a change of profit by switching from the domestic to the export market (equation 5). The simulation exercise will give the precise impact of size expansion as well as rental price increase.

It is assumed that firms with more than 50 workers will expand by 100% as a benchmark, considering that financial institutes usually require collateral in Kenya and expansion by more than 100% may not be possible due to lack of collateral.

The result of the simulation for a larger firm is shown in Table 11 (the first line). Given slightly increasing returns of the production function, a 100% increase of production yields a 136% increase of profit on average, yet for 9 firms out of 11, the augment is less than 110%. This result indicates that exporting gives a nearly proportional increase of expected profit to local firms. Arranging the participation condition (1) for non-exporters, we have

$$\pi_t^f - \pi_t^d \geq \rho\left(E_t\left[V_{t+1}|s_t = 0\right] - E_t\left[V_{t+1}|s_t = 1\right]\right),$$

which indicates that profit increase needs to be large enough to cover the loss of future expected profits as a result of switching to the export market. And furthermore, the margin should also cover the risk premium for risk-averse firms. Credit access is critical for export participation of Type 2 firms, since the expansion of capacity is the only source of profit gains. Non-participation of local firms indicates that their credit

[23] We chose 20% considering information from World Bank RPED data, which showed that the interest rates of bank loans used by garment firms are between 17 and 21%. See appendix 2 for the estimation method of rental prices.

access did not allow profit gains to cover future loss and risk premium.

Diversifying case (Type 3 firms)

Three firms with 50 workers and a minimum production scale are used for simulation. The production scale is set to the minimum. The result indicates that expected profit is positive for all three firms (line 2 in Table 11). And in two out of three firms, profit per capital value is larger than one; that is, one year of operation will cover capital investment. This simulation result indicates that the export market is expected to be very profitable.[24] Therefore, non-participation by those local firms can be attributed to their risk-averseness; that is, expected profitability was not large enough to cover the risk premium that local firms require.

6.3 Comparison with Exporters

All local Kenyan exporters, except for one case, started production for the export market as a new project rather than as an alternative to the domestic market like a Type 2 firm. Among four switched exporters, three firms were continuing domestic supply after starting to export. For the new exporters, they did not own a garment factory before they started exporting, and investment in a garment export project did not compete with those in domestic supply. According to Rhee and Belot [1989], the Bangladeshi garment industry was so small before the export boom started in the early 1980s that most of local exporters were established by former workers in exporting firms with local investors. This is the same pattern as that of the new exporters in Kenya. Their investment decision, therefore, does not compete with production for the domestic market. This evidence suggests that the export market is not generally attractive as an alternative to the domestic market, which is consistent with our simulation result and interview responses by local firms that gave less profitability of the export market as a reason not to start exporting (Table 4).

As described above, the investment decision of exporters in Kenya and Bangladesh was made independently of the profit of domestic supply. Hence, their decision problem is fundamentally the same as that of a Type 3 firm (the diversifying case). Expected profit in the diversifying case is compared between non-exporters and exporters to see the relationship between expectation and response to export opportunity. It is noted that we have data from the firms only of 2003, and we do not have information on firms that started to export in that year; that is, a counterpart of the local non-exporter.[25] Then, characteristics of such firms were replicated from those of exporters in our survey sample. Estimating the correlation between firm age and characteristics among exporters, firms that started exporting in 2003 were reproduced.[26] The comparison shows that the average expected profit of Kenyan local exporters is higher than that of non-exporters but the difference is not significant (line 3 in Table 11). Figure 2 shows that distributions of expected profits for local exporters and non-exporters overlap. This is a result of the fact that differences in

[24] This tendency does not alter even if we include other local firms in the simulation. For 11 local firms with more than 50 workers, the median is 3.0. High profit-capital ratio is a feature of exporters in our survey sample. The same trend was observed in Bangladeshi garment firms in Bakht et al. [2009].

[25] This is because the sample was drawn from the firm lists updated in early 2003 or before.

[26] See Appendix 3 for results of the estimation.

efficiencies and factor prices between local exporters and non-exporters are small. It indicates that different responses to export opportunity were explained by the fact that local exporters are less risk averse than non-exporters.

In contrast, a comparison with Bangladeshi exporters yields a large and significant difference in expected profits (line 4 in Table 11). On average, the expected profits of Bangladeshi firms are greater than Kenyan non-exporters by 1.8 times. The peak of the distribution of expected profits for Bangladeshi firms lies to the right hand side of the distribution of Kenyan non-exporters, and the overlap is small (Figure 2). Therefore, in comparison with Bangladeshi firms, most Kenyan local firms expected smaller export profit, and this is one of the reasons for their less active response to export opportunity. In conjunction with our conclusion in section 6.2, we can conclude that Kenyan local firms did not diversify to the export market due to risk-averseness, yet it does solely account for the different response from Bangladeshi firms; they are more likely to be motivated to export even if they are as risk averse as Kenyan firms.

In this simulation exercise, output is set equal to all firms, and thus, the difference of expected profits arises from difference of cost. As equation (5) indicates, difference of cost is caused by either factor prices or efficiencies. By taking the ratio of total cost function (4), contribution of factor prices and efficiencies to ratio of total costs of two firms are found in the following form,

$$\frac{TC_i}{TC_j} = \left(\frac{r_i}{r_j}\right)^{\frac{\beta 1}{\beta}} \left(\frac{ws_i}{ws_j}\right)^{\frac{\beta 2}{\beta}} \left(\frac{wu_i}{wu_j}\right)^{\frac{\beta 3}{\beta}} \left(\frac{TE_i}{TE_j}\right)^{\frac{-1}{\beta}} \frac{\overline{AE}_i \cdot \eta_i}{\overline{AE}_j \cdot \eta_j}.$$

We decompose the ratio of average costs by inserting the average values of Kenyan non-exporters in the numerator and those of Bangladeshi young exporters in the denominator. The results are in Table 12. The total cost of Kenyan non-exporters is 2.19 times higher than that of Bangladeshi young exporters. Among the determinants, wages appeared to be the largest contribution; skilled and semi-skilled wage pushed up total cost of Kenyan firms by 2.32 times on average (=1.27*1.83). On the other hand, the average contribution of technical efficiency is cost reducing, and that of allocative efficiency is close to neutral. This is mainly because the difference of wages is much larger than that of efficiencies and rental prices.

Through estimation of production function and expected profits, it is demonstrated that simply switching from domestic supply to export does not bring about an increase of profits. Though the export market provides the opportunity for profit gain through expansion of the production scale, it did not appear to be large enough to cover opportunity cost of switching to export or risk premium. This also holds for exporters, of which few firms actually switched from domestic supply. In the case of diversifying to the export market, simulation found that expected profits are positive and large, and the participation condition was met for risk-neutral firms. The risk-averse preference of local firms was what primarily led to non-participation in export. Risk preference also explains the different response of Kenyan local exporters, yet it does not necessarily when compared with Bangladeshi exporters. In comparison with Asian firms, the limited participation of Kenyan local firms resulted from relatively small profits in the export market.

7. Conclusion

FDI in the garment sector has been the only case of large-scale manufacturing investment in the African low-income countries since the 1990s. While FDI has triggered development of local garment industries in many developing countries, this has not yet been seen in Africa. This can be partly attributed to the termination of MFA, which resulted in a stagnation of exports from Africa, but our investigation of the Kenyan industry suggested that it is also related to the local factor markets.

While local firms can absorb technology and market information by employing skilled expatriates, the majority of them were unable to finance the minimum production scale needed for export production due to credit constraint. Some firms were able to prepare capital by giving up domestic supply. However, profit gain by export participation stems only from expansion of production, and in this case, the export decision required a consideration of the opportunity cost of market switch, which includes the sunk cost needed to re-enter a domestic market. Under local firms' financial capacity of expansion, export profit was not large enough to cover the opportunity cost of exporting and risk premium that a risk-averse firm requests. Switching from a domestic market was not a viable choice in our sample that included exporters.

In the case where a firm starts export supply as a new project in addition to domestic supply (or any other business), the investment decision depends solely on export profits. Our simulation indicated positive and high expected profit relative to capital value, and hence, non-participation is attributed to the risk-averseness of Kenyan local firms. Risk-averseness also accounts for the difference of response of Kenyan exporters, but it is not the sole determinant of the difference from Bangladeshi firms. Their expected profit is significantly higher than that of Kenyan local firms and it clearly gave an advantage to Bangladeshi firms.

In the Kenyan garment industry, credit constraint, rather than absorptive capacity, is a primary source of inactive participation in export opportunity. Only firms which afford additional production facilities without sacrificing domestic supply may be motivated to start exporting. However, in comparison with successful Asian exporters, those firms were not as motivated as Asian exporters due to the large gap in expected profits.

References

Aitken, Brian, Gordon H. Hanson, and Ann Harrison [1997] "Spillovers, Foreign Investment, and Export Behavior," *Journal of International Economics*, Vol. 43, No. 1-2, pp.103-132.

Athukorala, Prema-chandra and Sarath Rajapatirana [2000] *Liberalization and Industrial Transformation: Sri Lanka in International Perspective*, Oxford; Oxford University Press.

Bakht, Zaid, Tatsufumi Yamagata and Mohammad Yunus [2009] "Profitability and Diversity among Knitwear-Producing Firms in Bangladesh: The prospects of a labor-intensive industry in a least developed country," *Developing Economies*, Vol.47, No.3, pp.340-366.

Bernard, Andrew B., and J. Bradford Jensen [1999] "Exceptional Exporter Performance: Cause, effect, or both?," *Journal of International Economics*, Vol.47, No.1, pp.1-25.

Biggs, Tyler, Manju Shah and Pradeep Srivastava [1995] *Technological Capabilities and Learning in African Enterprises*, World Bank Technical Paper No. 285, Washington D.C; World Bank

Bigsten, Arne and Mans Soderbom [2005] *What Have We Learned from a Decade of Manufacturing Enterprise Survey in Africa?*, World Bank Policy Research Working Paper 3798, World Bank.

Bigsten, Arne, Paul Collier, Stefan Dercon, Bernard Gauthier, Jan Willem Gunning, Anders Isaksson, Abena Oduro, Remco Oostendorp, Cathy Pattilo, Mans Soderbom, Michel Sylvain, Francis Teal and Albert Zeufack [2003] "Risk Sharing in Labor Markets", *World Bank Economic Review*, Vol.17, No.3, pp. 349-366.

Bigsten, Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Willem Gunning, Abena Oduro, Remco Oostendorp, Cathy Pattilo, Mans Soderbom, Francis Teal and Albert Zeufack [2004] "Do African Manufacturing Firms Learn from Exporting?," *Journal of Development Studies*, Vol. 40, No.2, pp. 115-141.

Bowman, Larry W. [1991] *Mauritius: Democracy and Development in the Indian Ocean*, Boulder; Westview Press.

Caves, Douglas W.; Laurits R. Christensen; and W. Erwin Diewert. 1982. "Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers." *Economic Journal* 92, no. 365: 73–86.

Chamley, Christophe P. [2004] *Rational Herds: Economic Models of Social Learning*, Cambridge: Cambridge University Press.

Clerides, K. Sofronis, Saul Latch, and James R. Tybout [1998] "Is Learning by Exporting Important?: Micro-dynamic evidence from Columbia, Mexico, and Morocco," *Quarterly Journal of Economics*, Vol. 113, No.3, pp. 903-947.

Collier, Paul and Jan Willem Gunning [1999] "Explaining African Economic Performance ", *Journal of Economic Literature*, Vol.37. No.1, pp.64-111.

Delgado, Miguel A., Jose C. Fraiñas, Sonia Ruano [2002] "Firm Productivity and Export Markets: A non-parametric approach," *Journal of International Economics*, Vol. 57, No.2, pp.397-422.

Dixit, Avinash K. and Robert S. Pindyck [1994] *Investment under Uncertainty*, Princeton; Princeton University Press.

Ernst, Dieter, Tom Ganiatsos and Lynn Mytelka eds. [1998] *Technological capabilities and Export Success in Asia*, London: Routledge.

Evenson, Robert E. and Larry E. Westphal [1995] "Technological Change and Technology Strategy," in J. Behrman and T.N. Srinivasan eds., *Handbook of Development Economics*, Volume III, Elsevier Science, pp2209-2299.

Export Processing Zones Authority [2002-2006] *Annual Report*, Nairobi; Export Processing Zones Authority.

Foster, Andrew D, and Mark R. Rosenzweig [1995] Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture, *Journal of Political Economy*, Vol.105, No.6, pp.1176-1209.

Fukunishi, Takahiro [2004] *International Competitiveness of Manufacturing Firms in sub-Saharan Africa*, IDE Discussion Paper Series No.2, Chiba: Institute of Developing Economies.

Gereffi, Gary, and Olga Memedovic [2003] *The Global Apparel Value Chain: What prospects for upgrading by developing countries*, Vienna: United Nations Industrial Development Organization.

Glass, Amy Jocelyn and Kamal Saggi [1998] "International Technology Transfer and the Technological Gap," *Journal of Development Economics*, Vol. 55, No.2, pp. 369-398.

Greenway, D., N Sousa, and K. Wakelin [2004] "Do Domestic Firms Learn to Export from Multinationals?," *European Journal of Political Economy*, Vol. 20, No.4, pp. 1027-1043.

Grima, Sourafel, David Greenway, and Richard Kneller [2004] "Entry to Export Markets and productivity: A microeconometric analysis of matched firms," *Review of International Economics*, Vol.12, No.5, pp. 855-866.

Issakson, Anders, and Clas Wihlborg [2002] "Financial Constraints on Kenyan Manufacturing," in Arne Bigsten and Peter Kimuyu eds., *Structure and Performance of Manufacturing in Kenya*, Basingstoke: Palgrave.

Javorcik, Beata S. and Mariana Spatareanu [2009] "Liquidity Constraints and Firm's Linkages with Multinationals," World bank Economic Review Vol. 23, No.2, pp.323-346.
Jondrow, J, C.A.K. Lovell, I.S. Materov, and P. Schmidt [1982] "On the Estimation of Technical Inefficiency in the Stochastic Frontier Production Function Model," *Journal of Econometrics*, Vol. 19, No.2-3, pp.233-238.
Jovanovic, Boyan and Yaw Nyarko [1996] "Learning by Doing and the Choice of Technology", *Econometrica*, Vol.64, No.6, pp. 1299-1310.
Kapur, Sandeep [1995] "Technological Diffusion with Social Learning," *The Journal of Industrial Economics*, Vol.XLIII, No.2, pp.173-195.
Keller, Wolfgang [1996] "Absorptive Capacity: On the Creation and Acquisition of Technology in Development," *Journal of Development Economics*, Vol. 49, pp.199-227.
Kumbhakar, S.C., S. Gosh and J.T. McGuckin [1991] "A Generalized Production Frontier Approach for Estimating Determinants of Inefficiency in US Dairy Farms," *Journal of Business and Economics Statistics*, Vol.74, No.2, pp.231-239.
Kumbhakar, Subal C. and C.A. Knox Lovell [2000] *Stochastic Frontier Analysis*, Cambridge; Cambridge University Press.
Lall, Sanjaya ed. [1999] *The Technological Response to Import Liberalization in SubSaharan Africa*, London; Macmillan Press.
Lall, Sanjaya and Shujiro Urata eds. [2003] *Competitiveness, FDI and Technological Activity in East Asia*, Cheltenham; Edward Elgar.
Lall, Sanjaya and Ganeshan Wignaraja [1994] "Foreign Involvement and Garment Exports by Developing Countries," *Asia-Pacific Development Journal*, Vol.1, No.2.
Levinson, James and Amil Petrin [2003] "Estimating Production Functions Using Inputs to Control for Unobservables," *Review of Economic Studies*, Vol.70, No.2, pp.317-341.
McCormick, Dorothy, Mary Njeri Kinyanjui and Grace Ongile [1997] "Growth and Barriers to Growth among Nairobi's Small and Medium-Sized Garment Producers," *World Development* Vol.25, No.7, pp.1095-1110.
Nelson, Richard R. and Edmund S. Phelps [1966] "Investment in Humans, Technological Diffusion, and Economic Growth," *The American Economic Review*, Vol.56, No.1/2, pp.69-75.
Nelson, Richard R. and Sidney Winter [1982] *An Evolutionary Theory of Economic Change*, Cambridge; Havard University Press.
Nissanke, Machiko and Ernrst Aryeetey [1998] *Financial Integration and Development: Liberalization and reform in sub-Saharan Africa*, London: Routledge.
Nordas, Hildegunn Kyvik [2004] *The Global Textile and Clothing Industry post the Agreement on Textile and Clothing*, Discussion Paper No.5, Geneva, World Trade Organization.
Olley G. Steven and Ariel Pakes [1996] "The Dynamics of Productivity in the Telecommunications Equipment Industry", *Econometrica*, Vol.64, No.6, pp.1263-1297.
Olson, Jerome A., Peter Schmidt, Donald M. Waldman [1980] "A Monte Carlo Study of Estimators of Stochastic Frontier Production Functions," *Journal of Econometrics*, Vol.12, No.1, pp.67-82.
Pack, Howard [1993] "Productivity and Industrial Development in Sub-Saharan Africa," *World Development*, Vol.21, No.1, pp.1-16.
Rhee, Yung Whee and Therese Belot [1989] *Export Catalysis in Low-Income Countries*, Industry and Energy Department Working Paper, Industry Series Paper No.5, Washington D.C.; The World Bank.
Roberts, Mark J and James R. Tybout [1997] "The Decision to Export in Columbia: An empirical model to entry with sunk costs," *American Economic Review*, Vol. 87, No. 4, pp. 545-564.
Rodriguez-Clare, A. [1996] "Multinationals and Linkages, and Economic Development", *American Economic Review*, Vol. 86, No. 4, pp.852-873.
Romer, Paul M. [1992] "Two Strategies for Economic Development: Using Ideas and Producing Ideas," *Proceedings of the World Bank Annual Conference on Development Economics 1992*, World Bank; Washington D.C.
Saggi, Kamal [2002] "Trade, Foreign Direct Investment, and International Technology Transfer: A Survey," *The World Bank Research Observer*, Vol.17, No.2, pp.191-235.
UNCTAD (United Nations Conference on Trade and Development) [2002] *World Investment Report 2002*, New York and Geneva; United Nations.
United Nations Statistical Division [2006] *Commodity Trade Data Base-Comtrade*, World Bank (WITS), (accessed on 20th April 2006)
Van Biesebroeck, Johannes [2005] "Exporting Raises Productivity in Sub-Saharan African Manufacturing Firms," *Journal of International Economics*, Vo.67, No.2, pp. 373-391.
Wignaraja, Ganeshan and Gerrishon Ikiara [1999] "Adjustment, Technological Capabilities and Enterprise Dynamics in Kenya," in Lall, Sanjaya ed., *The Technological Response to Import Liberalization in SubSaharan Africa*, London: MacMillan Press LTD.

World Bank [2006] *World Development Indicators 2006,* CD-ROM, Washington D.C., World Bank.

Table 1 Performance of Garment EPZ Firms

	2000	2001	2002	2003	2004	2005
Number of Enterprises	6	17	30	35	30	25
Exports (million US$)	30	55	104	146	221	195
Investment (million US$)	16	48	88	128	108	132
Employment	5,565	12,002	25,288	36,348	34,614	34,234
Expatriates	235	314	701	912	837	

Source: Export Processing Zones Authority [various issues]

Table 2 Overview of the Garment Industry in Kenya (2003)

	Number of Firms	Total Employment	Total Production (mil.Kshs)	Employment per firm	Average Turnover (mil. Kshs)	Share of Exporter (%)	Share of foreign firm (%)
EPZ Firm	35	36348	11083	1038.5	316.7 ($4.0 mil)	100.0	100.0
Local Firm	*120-150*	*8000-9500*	*2200-2600*	88.2	42.9 ($0.5mil)	27.6	16.9
Local Exporting Firm	19	—	—	231.1	60.0 ($0.75mil)	100.0	0

Source: (EPZ Firm) Export Processing Zones Authority [2004], (Local Firm) Firm survey in 2003, figures shown in italic are estimated, (Local Exporter) Author's interview,

Table 3 Local Firms Specializing in Export to US

	Total	In operation in 2006
Local Exporter	19	6
New Exporter	15	4
Switched Exporter	4	2

Source: Author's interview with firms and the industrial association.

Table 4 Reason not to take subcontract of EPZ firms

Question: Why did not your company attempt to take subcontract of EPZ firms?

(N=18, multiple answer)

	Number of replies
No offer/contact from EPZ firms	6
Current business is sufficiently profitable	3
Export market is not profitable	10
Export market is risky	6
Difficulty in physical investment	10
Difficulty in training	2
Other	5

Source: Author's interview in 2005 and 2006

Table 5 Sample Size of Interview and Survey in Kenya

		Interview (2005-6)	Survey (2003)	Population
Total		28	47	
Local non-Exporting Firms		18	39	120-150* (2003)
Local Exporting Firms	Switched Exporters	3	1	4** (2001-06)
	New Exporters	7	2	15** (2001-06)
EPZ firms		5	5	35 (2003)

*: Estimation by the author for firms with more than 10 employees.
**: Total number of firms existed between 2001 and 2006.

Table 6 Average of Technical Efficiency and Relative TFP

		1	2	3	4	
		Technical Efficiency				
		SF Half Normal	SF Exponential	OLS and Method of Moment Half Normal	Relative TFP	N
1	Total	0.549 (0.168)	0.650 (0.162)	0.495 (0.201)	-0.134 (0.805)	212
2	Kenyan Local Exporter	0.731 (0.075)	0.800* (0.050)	0.692 (0099)	0.448 (0509)	3
3	Bangladeshi and Kenyan EPZ Exporters	0.548 (0.174)	0.648 (0.169)	0.497 (0.205)	-0.143 (0.838)	170
4	Exporter	0.551 (0.174)	0.650 (0.169)	0.500 (0.205)	-0.133 (0.836)	173
5	Non-Exporter	0.540 (0.140)	0.650 (0.133)	0.474 (0.180)	-0.139 (0.659)	39

Note: Corresponded production function estimates of the results in column 1, 2, 3 are shown in column 6, 7, 5 in Table 9, respectively.
* indicates difference with the figure in line 3 is significant at 5%.

Table 7 Necessary Addition of Capital by Firm Size

	Ratio of addition to initial capital			
Employment	0%	[0%, 50%)	[50%, 100%)	more than 100%
50≤	3	7	1	0
30-49	0	1	2	0
30>	0	1	3	23
Total	3	9	6	23

Note: Numbers of firms are indicated by ratio of addition and employment size (N= 39).
Shaded area indicates firms able to finance capital addition.
Source: Author's estimation

Table 8 Credit availability of Local Firms by Firm Size

	Credit Use Experience (last 5 years)		Credit Accessibility		
Employment	Yes	No	Yes	No	Unknown
50≤	9	3	10	0	2
30-49	0	1	1	0	0
30>	1	4	1	4	0
Total	10	8	12	4	2

Note: Local firms not exporting only (N=18). Access to formal credit (excluding micro finance) was questioned.

Source: Author's interviews

Table 9 Production Function Estimation

Dependent variable: ln *Value Added*

	1	2	3	4	5	6	7
	OLS	SF	OLS	SF	OLS and Method of Moment	SF	SF
		Half Normal		Half Normal	Half Normal	Half Normal	Exponential
ln *K*	0.170 (0.131)	0.210** (0.085)	0.137 (0.091)	0.172** (0.072)	0.128 (0.089)	0.158** (0.073)	0.163** (0.072)
ln *Ls*	0.357** (0.153)	0.333*** (0.121)	0.381*** (0.133)	0.446*** (0.106)	0.394*** (0.129)	0.447*** (0.109)	0.452*** (0.107)
ln *Lu*	0.419** (0.169)	0.278** (0.126)	0.484*** (0.153)	0.393*** (0.118)	0.546*** (0.135)	0.479*** (0.105)	0.478*** (0.105)
Sewing	0.142 (0.131)	0.189 (0.124)	0.137 (0.121)	0.191 (0.127)	0.150 (0.120)	0.201 (0.133)	0.243* (0.127)
ln*K*NoExport*	-0.118 (0.210)	-0.135 (0.159)					
ln*Ls*NoExport*	0.049 (0.377)	0.240 (0.273)					
ln*Lu*NoExport*	0.190 (0.472)	0.191 (0.306)					
NoExport	-0.040 (1.447)	-0.654 (1.110)	-0.249 (0.277)	-0.314 (0.210)			
Constant	7.963*** (1.373)	9.179*** (0.844)	7.856*** (0.660)	8.470*** (0.566)	8.399*** (0.585)	8.060*** (0.509)	7.769*** (0.499)
σ_v^2					0.194*** (0.033)		
σ_u^2		0.891*** (0.284)		0.906*** (0.308)	1.234*** (0.143)	0.842*** (0.364)	0.290*** (0.127)
Auxiliary Model: Dependent var: lnσv2							
Sewing		1.847*** (0.707)		1.304** (0.569)		1.198** (0.541)	0.890** (0.422)
Constant		-2.897*** (0.710)		-2.391*** (0.548)		-2.206*** (0.501)	-1.822*** (0.358)
Constant returns to scale: χ2 and p-value			0.000 [0.979]	0.030 [0.870]	1.94 [0.165]	2.54 [0.111]	3.43 [0.064]
Average technical efficiency		0.542 (0.177)		0.540 (0.176)	0.495 (0.201)	0.549 (0.168)	0.650 (0.162)
N	212	212	212	212	212	212	212

Note: White's heteroskedasticity robust standard errors are reported for OLS.
Constants are larger in frontier models given that they represent production frontiers.
TE in OLS3 is calculated by method of moment estimation. See text for detail.
Constant for the OLS and Method of Moment is adjusted so that function represents frontier (+E[u]).

Table 10 Estimation of Learning-by-Exporting Effect

(a) Effect on technical efficiency Dependent variable: ln (Value added)		
	SF Truncated Normal	SF Truncated Normal
ln *K*	0.108 (0.079)	0.188** (0.076)
ln *Ls*	0.431*** (0.139)	0.440*** (0.105)
ln *Lu*	0.605*** (0.148)	0.483*** (0.116)
Sewing	0.260 (0.200)	0.346*** (0.127)
Constant	7.657*** (0.540)	7.572*** (0.509)
Auxiliary Model: Dependent variable μ		
Age	-0.038 (0.226)	0.059 (0.229)
*Age*Export*	0.128 (0.273)	-0.035 (0.244)
Manager-Edu	-1.297 (1.715)	
Delivery	0.064 (0.073)	
Sales Collection	-0.093 (0.088)	
Blackout	0.022 (0.020)	
*Blackout*Generator*	-0.025 (0.037)	
Export	2.762 (5.512)	2.544 (9.947)
Constant	-2.180 (5.951)	-11.058 (41.382)
σ_u^2	1.098 (2.065)	6.559 (20.767)
σ_v^2	0.407* (0.199)	0.249*** (0.069)
N	183	208

(b) Effect on Cost allocative efficiency Dependent variable: ln (Cost of AE)		
	OLS	OLS
Age	0.001 (0.003)	0.002 (0.002)
*Age*Export*	-0.003 (0.004)	-0.005** (0.002)
Manager-Edu	0.016 (0.060)	0.001 (0.061)
Manager-Exp	-0.002 (0.002)	-0.002 (0.002)
Export	-0.049 (0.061)	
Constant	0.225*** (0.070)	0.197*** (0.057)
R^2	0.048	0.042
Hausman's Specification test		
$\chi^2(4)$ p-value		4.79 [0.309]
N	182	182

Note: White's heteroskedasticity robust standard errors are reported.
Hausman's test was carried out based on the IV estimates using average tenure of skilled and semiskilled workers for *Age*.

Table 11 Simulation of Expected Profits

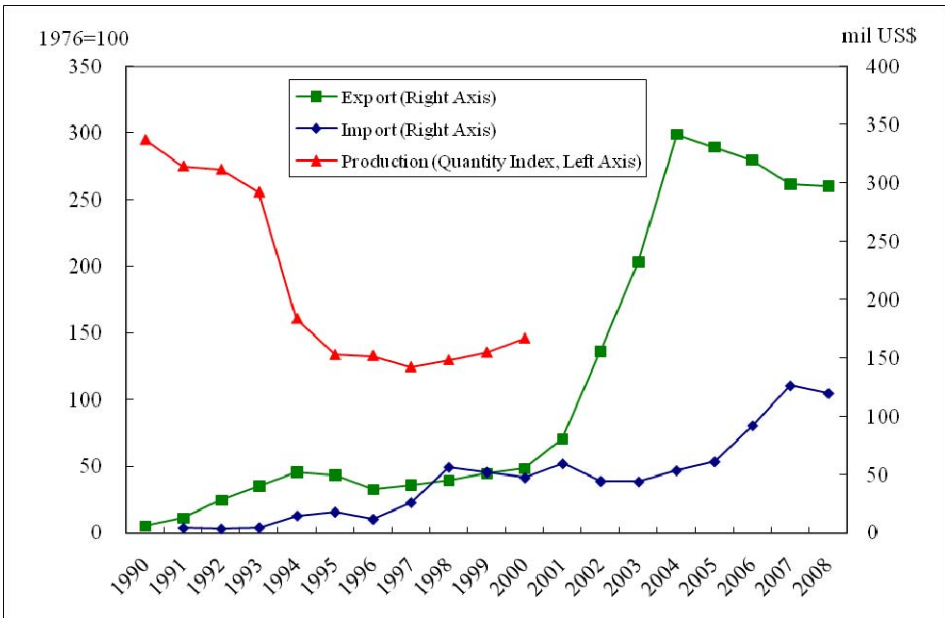
		Mean	Median	Std. Dev	Min	Max	N
Specializing Case: Ratio of Export Profit to Domestic Profit							
1	Kenyan Local non-Exporter	1.357	1.055	0.980	1.018	4.305	11
Diversifying Case: Expected Profit (US$)							
2	Kenyan Local non-Exporter	108672	148830	77014	19879	157306	3
3	Kenyan Local Exporter	149949		56649	96520	209345	3
4	Bangladeshi Exporter	194479		39856	76718	241171	51

Table 12 Decomposition of the Difference of Expected Cost

		Kenyan Local Mean / Kenyan Exporter Mean	Kenyan Local Mean / Bangladeshi Mean
Expected cost (a)	TC_i/TC_j	1.500	2.191
Rental price (b)	$(r_i/r_j)^{\beta 1/\beta}$	1.000	1.032
Skilled Wage (c)	$(ws_i/ws_j)^{\beta 2/\beta}$	1.123	1.270
Semi-skilled Wage (d)	$(wu_i/wu_j)^{\beta 3/\beta}$	1.085	1.826
Technical Inefficiency (e)	$(TE_i/TE_j)^{-1/\beta}$	1.621	0.911
Allocative Inefficiency (f)	$AE_i\eta_i/AE_j\eta_j$	0.760	1.005

§: 'Process Effect' captures difference in constants of cost function (*A* in equation 4 in appendix 2) by the process dummy (*sewing*).
Note: As indicated by the equation in the text, a=b*c*d*e*f.

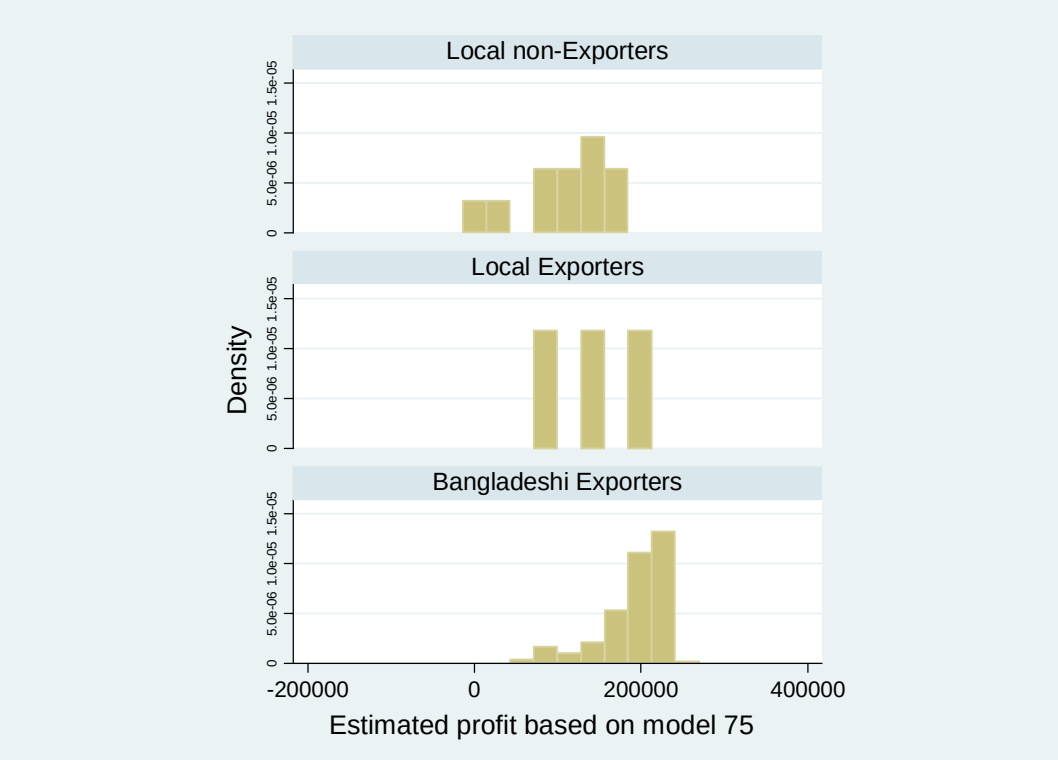
Figure 1 Garment Production, Exports and Imports



Note: Imports includes secondhand clothing after 1997 when data become available. Production index is dropped after 2000, because it is unlikely to cover EPZ production.

Source: (production) Central Bureau of Statistics, *Economic Survey*, and *Statistical Abstract*
(Export and Import) UN Comtrade.

Figure 2 Distribution of Expected Profits



Appendix 1. List of Local Exporters

Table A1 Local Exporters (including not interviewed)

	Year Stat Operation	Ethnicity of Owner	Market	Employment	Sewing Machine	Sales (mil Ksh)
A	1978	Asian	USA 17%, EU 26%, EAC 43%, Local 15%	*800*	*350*	*265.2*
B	1990	British	USA 61%, UK Swiss 11%, Kenya 28%	*175*	*42*	*36.1*
C	1996	Asian	Mainly USA	13		
D	1997	African	USA 100%	347	302	56.2
E	2001	African	USA 100%	84	36	21.3
F	2001	Asian	USA 100%	311	233	144
G	2001	Asian	USA 90%, Kenya 10%	138	125	74.5
H*	(2002)	(African)				
I*	(2003)	(Asian)				
J	2004	African	Mainly USA	70	60	6.5
K	2004	African	USA 100%	230	139	
			Kenya, West Africa	*45*	*139*	*8.4*
L*	(2004)	(African)				
M	2004	African	USA 100%	233	216	17.8
N	2004	African	USA, EU	135	84	5.9
O	2004	African	USA 100%	206		
P	2004	African	USA 100%	*270*	*133*	*34*
Q	2005	African	USA 50%, EU 50%	166	117	24
R	2005	African	USA 100%	340	550	34.1
S	2006	African	USA 95%, Japan 5%	*180*	*250*	*na*

Note: Information of the firms stopped operation indicates record when firms were operated, and for the firms in operation as of Dec. 2006, it is the latest figure (FY2005-06, shown in italic). For Firm K, information in the upper column is when it was taking CMT, and that in the lower column is after it shifted to local market.

Firm A, B, D, J, K, M, P, Q, R, and S (bolded) were interviewed by the author in 2005 and/or 2006 (some of them are covered by the firm survey). Firm C, E, F, G, and O were covered by firm survey in 2003 and/or 2005. Information of firm H, I, and L (with asterisk) was from Kenyan Association of Manufacturers. Information in parenthesis is from indirect source. Blank space means no information.

Nationality of Expatriate	Operation Status (as of Dec 2006)	Previous Occupation of Owner	Note
India, UK	in operation	Working in the same company	Started UK export in 1992, US export in 2002
No expatriate	in operation	Textile trader in West Africa	Started US export in 2004
	(Closed 04/05)		Started US export in 2003
Bangladesh, Sri Lanka	in operation [mainly domestic]	Garment firm	
	Closed 04/05		
	Closed 04/05		
	Closed 04/05	Garment firm [relative of a local firm owner]	
	(Closed 04/05)		
	(Closed 04/05)		
Sri Lanka	Closed 06	Textile trading, Min of Defense	
India	in operation [mainly domestic]	Owner of supermarket, Banker	
Sri Lanka	(Closed 04/05)		
Sri Lanka	Closed 06	Cargo business in East Africa	
	Closed 06		
	Closed 06	(wife of former president)	
Sri Lanka	in operation	Shoes trading business	
Sri Lanka	Closed 06	Horticulture trading, Min of Treasury	
India	Closed 06	HR manager of EPZ, HR manager of bank	Took over firm O
India	in operation	Min of Local Government, Engineering consultant	Took over firm M

Appendix 2. Summary of the 2003 Firm Survey

Firm surveys were jointly conducted with the Institute of Developing Economies, the Institute of Development Studies, University of Nairobi, and the Institute of Business Administration, University of Dhaka in 2003.

The Kenya survey began with construction of a firm list since there is no comprehensive firm list. Integrating several incomplete lists, including lists compiled by the Central Bureau of Statistics, the Investment Promotion Center, the Export Processing Zones Authority, the Kenyan Association of Manufacturers and the Institute of Development Studies, an extensive firm list containing 322 firms with more than 10 employees in Nairobi, Mombasa, Nakuru, Thika and Eldoret was constructed. Because this list includes firms that had closed down, all firms in the list were contacted and interviews were conducted with those still in operation. They survey collected information of 71 firms out of 104 firms in operation. Neither the population nor characteristics of the remaining 33 firms were known, it is difficult to determine whether our samples have bias or not except that responses from EPZ firm were less than other firms.

In the Bangladesh survey, samples were selected from the member list of the Bangladesh Garment Manufacturers and Exporters Association (BGMA) using a stratified sampling method. Another industrial association, the Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA), which is mainly constituted by knit wear producers, was not included in order to retain accordance with the Kenyan sample that was mainly composed of woven wear producers. Among 2891 members, data was collected from 222 firms. For detail of the sampling procedure, see Fukunishi et al. [2006].

Table A2 Average Output and Input by Group

	Gross output (1000US$)	Value added (1000US$)	Number of workers	Capital value (1000US$)	Profit/ VA	N
Bangladeshi Firms	2977.7 (2247.7)	1554.1 (1261.5)	535.2 (250.7)	121.1 (85.1)	0.715 (0.228)	165
Kenyan Local Firms	549.8 (1115.5)	261.5 (720.3)	78.5 (161.5)	45.2 (91.0)	0.252 (0.502)	42
Kenyan EPZ Firms	13800.0 (21100.0)	8739.4 (15100.0)	892.4 (376.9)	716.8 (809.8)	0.481 (0.486)	5

Note: Standard deviations are in parentheses.

Rental costs are estimated. Assuming that all investments yield same rate of return and perfect foresight, rental price was estimated by the arbitrage condition

$$R_i = r_{i,t} p_{i,t} - \delta p_{i,t} + (p_{i,t+1} - p_{i,t}),$$

where R: rate of return (real interest rate), δ: depreciation rate, and p_t: asset price of capital at t. Since all firms have used imported equipment, it is assumed that asset prices are same for all samples, $p_i = p$. Arranging the arbitrage condition, rental price is given as

$$r_{i,t} = \left(R_i + \delta - \frac{p_{t+1} - p_t}{p_t} \right) p_t .$$

For added capital, real interest rate is obtained by subtracting GDP deflator from nominal interest rate, 20%. For existing capital, real interest rates listed in *World Development Indicators* are used (average of 1999 to 2003). Asset price is normalized to one, and its growth rate is drawn from US deflator of capital goods. Consequently, rental price is set to 0.2387 and 0.17068, respectively.

Appendix 3. Simulation of Capital demand and Expected Profits

1. Necessary Capital to Start Exports

Conditional capital demand function is given by the first equation (3). Firm's own factor prices, technical and allocative efficiency, and the minimum output level, set to 262643.7 US$ is inserted into the equation. For the firms needing addition of capital, higher rental rate is used according to its rate of addition. Considering that utilization rate of capital is less than 100% in most exporters, cost of unused capital (η) is set to the average of exporters. The simulated capital value reflects firm's characteristics.

Additional capital value needed for export is obtained by subtracting existing capital value from estimated capital value. Only currently utilized capital value are counted for existing capital, assuming that utilization rate reflects equipment's exchangeability for export production. That is, equipment currently used infrequently will be less used for production of export products.

2. Expected Profits of Export Market

Cost function given by (4) is used for simulation. Firm's own factor prices, technical and allocative efficiency are inserted. Output level is set to twice of current production (fitted value) for the case of switching case (please refer to the text for reasoning), and to the minimum level, 262643.7 US$, for the case of diversifying, since some firms may not afford to start with larger scale. Rental price reflects addition of equipment of individual firm. Cost of unused capital (η) is also changed to the average of the exporting firms.

Profits are obtained subtracting simulated cost as well as rent that is not included in the cost function, from output value.

Expected profits of diversifying case were estimated for both local non-exporters and exporters in Kenya and Bangladesh for the purpose of comparison. As our one-time dataset does not contain information of the firms started export in 2003, we replicated such firms from the young exporters with experience less than 3 years. Replication is based on adjustment of age effect of firm's characteristics. We found that firm age has significant correlation with skilled wage in Kenyan firms and with cost of allocative efficiency (AE bar) among pooled samples (Table A3). Given weak explanatory power of these regressions, only marginal change by firm age was reflected for skilled wage of Kenyan exporters and cost of allocative efficiency for all young exporters. By using only young exporters, bias that may be caused by the replication procedure was minimized.

Table A3 Estimate of Firm Age Effect

	Pooled		Kenyan Firms		Bangladeshi Firms	
Dependent variable	Cost of allocative efficiency		Skilled wage	Semi-skilled wage	Skilled wage	Semi-skilled wage
Age	0.003	Age	*0.014***	0.006	-0.007	-0.008
	(0.002)		(0.007)	(0.004)	(0.007)	(0.006)
Age*Export	**-0.005*****	Sewing	0.000	0.000	0.001	0.000
	(0.002)		(0.002)	(0.001)	(0.000)	(0.000)
Manager's	-0.013	Location in	0.111	0.197	*0.171***	-0.074
Education	0.053	capital city	0.251	0.156	0.076	0.074
Managers	-0.002	non-EPZ	-0.313	0.161		
Experience (years)	0.002	dummy	0.838	0.412		
_cons	**0.158*****	_cons	**7.766*****	**6.384*****	**6.983*****	**5.807*****
	0.050		0.874	0.439	0.083	0.086
Adjusted R2	0.074		0.143	0.131	0.017	0.044
N	182		44	44	165	165

Note: Heteroskedasticity robust standard errors are in parentheses.